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CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—
Western Gas Association..... 169

EDITORIALS—
Brother Littleton's Preliminary Appeals..... 169
The Baltimore (Md.) Discriminative Suit..... 170
The Ohio Association's Programme..... 170
Mr. D. D. Flemming Resigns..... 170
Briefly Told..... 170
Seventeenth Annual Meeting of the New England Association of Gas Engineers—Official Report—Concluded from page 144..... 171
Discussion on Mr. F. S. Richardson's Paper—Report of Committee on President's Address—Associate Members—Committee on Memorials—The Question Box—"What is the best way to prevent a gas main, laid across a stone culvert, from being stopped up in the winter?"—"How much coke is used, by measure, to carbonize 2,240 pounds of coal, with yield per pound?"—"Can a gas company afford to devote its attention to electric lighting?"—Remarks of Mr. Page—Votes of Thanks—Report of Committee on Memorials.
Mr. T. Fletcher's Lecture on Curious Gas Flames..... 180
The Velsbach Incandescent Gas Burner..... 181
Mr. A. F. Upton Discusses Combustion..... 181
Notes from the West, by "Retort"..... 182
Proving or Testing Meters..... 182

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 183
The Proprietors of the Shaner Gas Coal Company—Destruction of an Electric Light Station—The Pawtucket (R. I.) Folks will Try it—To Burn all Night—To Erect a Holder—Mr. Attrill would Rather Not—The New York City Subways—The Weber Furnaces—Bermuda's Pleasant Breezes—Enlarging its Possessions—Grand Forks (Dak.) Ought to be Satisfied—To Leave Nebraska City, Neb.—To Furnish Electric Light—Retorts for the Quaker City Gas Works—Financial Standing of the Middletown (Ohio) Gas Company—They Want to See the Books—Street Lighting at Circleville, Ohio—Lowell's Cheap Gas—At Last it is Settled—Managers of the Albany (N. Y.) Edison Company—In Charge of the Fulton-Municipal Works—Changing the Buffalo (N. Y.) Method of Street Lamp Assessment—A Handsome Structure—Deacon Oberglock Did not Believe in Gas Meters—Increasing the Capital Stock—Swapping Gas Stock for a Race Track—Making it Larger—Chicago's Public Lighting Ordinance—One of the Possible "Snags" in the Joint Proposition—Visalia (Cal.) to Have Light—It Failed to Pass the Lower Branch—To Recover Damages—Talking of a Rival Gas Company in Manchester, N. H.—Notice of Removal—Annual Meeting, Boston (Mass.) Gas Light Company—Death of Mr. James H. Walker, Sr.
A Substitute for Coal..... 185
The Market for Gas Securities..... 186

[OFFICIAL NOTICE.]

Western Gas Association.

SECRETARY'S OFFICE, QUINCY, ILL., March 9, 1887.

The Tenth Annual Meeting of the Western Gas Association will be held at St. Louis, Mo., on the 11th, 12th, and 13th days of May. The Southern Hotel has been selected by the Committee of Arrangements for our abiding place, and the choice cannot fail to meet with the hearty approval of our members. With regard to a hall for our business sessions, it has been thought best to inaugurate a departure from our old-time custom of accepting (simply because it was "handy") any vacant room in the hotel building which might be placed at our disposal. Those who remember our unfortunate experience in St. Louis, three years ago, will, I am confident, give the new experiment an unqualified indorsement. A hall admirably suited to our requirements, on the corner of Sixth and Walnut streets, just one block from the Southern, has been secured by our diligent Committee, and when the hour for assembling arrives our members will applaud the selection as a most happy one. That the acoustic properties are admirable has been repeatedly demonstrated, while the size, location, and facilities of all kinds are faultless.

In the matter of securing reduced railway rates, I have no information that is particularly satisfactory or encouraging to offer. I am in receipt, however, of the following communication, which will explain itself. It is to be hoped that the vexed question referred to may be settled in our favor in time for us to derive some benefit from the decision.

CENTRAL TRAFFIC ASSOCIATION, PASSENGER DEPARTMENT,
OFFICE ASST. COMMISSIONER, CHICAGO, ILL., Feb. 16, 1887.

A. W. LITTLETON., Esq., Sec. Western Gas Association, Quincy, Ill.:

Dear Sir—Replying to your favor of the 14th inst., requesting reduced rates for delegates attending the Western Gas Association's annual meeting at St. Louis, on the 11th of May, I beg to say that, owing to the uncertainty as to what will be the rulings of the commission and the courts regarding reduced rates for societies, conventions, etc., under the Inter-State Commerce Law, this Association has decided not to make any further reduced rates for societies until some competent and definite interpretation of the law can be had, as it is the desire of the lines in this Association to conform to the spirit of the said law, and in no case to wilfully violate it. Further action on your application has therefore been deferred until the interpretation or ruling above referred to can be had. Very respectfully yours,

GEO. H. DANIELS.

Your Secretary is becoming a little uneasy for fear that a sufficient number of our members may not give favorable consideration to his request for papers. I hope that there may be no disappointment in this particular, but that a goodly number of our talented members (and we have scores of them) may put their shoulders to the wheel, or rather their pens to paper, and oblige us with their contributions. A. W. LITTLETON, Secretary.

BROTHER LITTLETON'S PRELIMINARY APPEALS.

The members of the fraternity have ample cause to know that a gas man's lot is not a happy one, despite the fact that the average or everyday citizen stoutly maintains to the contrary. In fact the latter party often goes upon the record as saying that no other billet can compare, in the matters of ease,

snugness, and wealthiness, with that enjoyed by the lucky gas maker. The trouble is that the average citizen does not discriminate properly; in fact he rarely condescends to give expression to other than "glittering generalities," deeming those that are ornately fringed with vituperation as best fitted to give expression to his well-founded(?) convictions. Now, did he say that an occasional director, who, reclining at ease in peaceful repose, in the declining years of a "well-spent life," calmly receives his dividend checks—the fruition of canny investments in the early days of gas development—enjoyed a "happy lot," he might be measurably near the truth. Still, the "occasional reclining director" is liable at any moment to have his elydoric visions ended by the rude hands of the gentlemen who are ever on the alert to start up an opposition gas company. The opposition can best be warded off by the patient and sagacious management of the executive officers, who save the "occasional director" to his ease only by dint of hard fighting in the local council boards, and often in the more extended arena of the State Legislature; not forgetting the continual conflict at home with the indignant consumer. And when we come to the "happy lot" of the engineer and superintendent; what a veritable bed of roses he enjoys! The "nagging" of his board; the struggle (without credit or renown) with the district assemblies, and the seemingly ubiquitous "walking delegate;" the delays of contractors; the freaks of the weather; the capriciousness of the product which he manufactures; the importunities of the inventors of and the agents for the sale of patent rights! Roses hardly express the situation; indeed thorns would seem to be about the proper thing to say. Now, adding to all these rueful items the plain fact that a brother engineer is elected to assume the Secretaryship of an Association of his fellows, how greatly aggravated is his lot. It, therefore, becomes the duty of his co-laborers to smooth, as best they may, the ruggedness of his pathway; and we respectfully submit that no other better attempt at amelioration can be vouchsaied him than by paying heed to his admonitions.

In Brother Littleton's second official announcement regarding the forthcoming Tenth annual gathering of the Western Association, at St. Louis, and less than two months separated from us by the calendar, we note he writes himself as "becoming a trifle uneasy for fear that a sufficient number of our members may not give favorable consideration to his request for papers." Now, this is not as it should be, and we have not the slightest doubt that the developments of the next 30 days will banish all fear in that respect from the cranium of the worthy Secretary of the Western Association. We will add that the recent sessions of the New England Association were most valuable to the industry, and made so by the papers read thereat. Neither hair-splitting nor verbosity characterized the literary productions; nor do we find that learned disquisitions on abstruse topics were presented for digestion. No; a common-sense and practical treatment of the questions dilated upon gave them that zest so valuable as an aid to keen appreciation. The Western Association members must not let others wrest from them the palm for good work in the technical field, and will therefore set at work with a will to keep themselves in the foremost rank. Littleton will not mind how groundless you may make his fears prove to be; in fact we surmise that the more completely you dissipate them the broader will be the smile of satisfaction that will play over his face. The only possible cause for danger in this instance would seem to lie in the direction that individuals may say to themselves, what is the need for me to present a paper when so many others are sure to be on hand? Even if vigilance be the price of success, better be vigilant and successful than to allow inertia to cause your defeat. One other item in Brother Littleton's current notice seems to call for comment, and that is in regard to the reply received from the Assistant Commissioner of the Central Traffic Association. We notice that the railway officials are in great accord in their desire not to infringe upon the tenets of the Interstate Commerce Law—more particularly so when those tenets refer to cheap railway fares. If they will only pay equal heed to some of its other provisions, the Hon. Mr. Reagan, of Texas, will receive the true homage of a grateful people!

THE BALTIMORE (MD.) DISCRIMINATIVE SUIT.

Some time since a suit was brought in the Circuit Court for the Baltimore district, nominally by Mr. Anthony Swarz, but really on behalf of some 7,000 gas consumers of Baltimore, who sought to have the practice of charging discriminative rates for gas, by the Consolidated Gas Light Company, declared unlawful. As the majority of our readers are aware the companies supplying gas in Baltimore are engaged in a war of competition. The Consolidated Company's mains reach all districts of the city; but those of its competitor are not so extensive. In sections piped by both companies the consumers are supplied at a charge of 50 cents per thousand cubic feet, while those entirely dependent for a supply on the Consolidated Company are charged $1 per thousand. Some time since the case was argued on its merits before Judge J. Upshur Dennis, in the Court above noted; and after due deliberation the learned gentleman announced his decision, which disallowed the claim of plaintiffs, on the broad ground that no injury had been done them. The case is of such importance that we deem it proper to give the following resume of the decision, as forwarded us by our Baltimore correspondent, who, having noted that Mr. Samuel Snowden represented the plaintiffs, Messrs. I. Nevett Steele, and J. Alexander Preston acting for the Company, says:

Judge Dennis said three questions were involved: "First, is the respondent company a corporation of such a character that its rules and regulations are subject to supervision and control by the courts? Second, if it is, is the discrimination complained of such that the court will declare it void on the ground of public policy? And third, have the complainants mistaken their remedy by proceeding in this Court?" On the first point he held that the case comes within the operation of the principle of State control of corporations; that the company is engaged in public employment, and must submit to public control. On the question whether the discrimination complained of in the bill is of such a character that the court must declare the rule of the company which prescribes it unjust and unreasonable, and therefore void, Judge Dennis said the "extent to which the control by the State of corporations of this quasi-public character goes is well defined. In many States acts of the Legislature have fixed it, but it has always been held that these acts were simply declaratory of the common law, and that in the absence of statutory enactments the power existed to its full extent in the courts, and the limits of that power confine us to determining whether the rules or regulations which are brought in question are *reasonable* and *just*. Further than that the courts cannot go. They have no right to interfere with the purely private concerns of the corporation, or with any methods of business it may choose to adopt, provided no *wrong* is done to the complainants thereby.

"The complainants themselves, however, admit that the price charged for gas is less than it is furnished for in any other city, and is a reasonable price. The residents in the non-competitive district have no right to complain (so long as the charge made to them is reasonable) because the residents in the competitive districts have their gas furnished at a lower rate. Suppose the court should decide that the company must charge all alike—the $1 per thousand feet. The complainants would receive no benefit, but the residents of the competitive districts would be made to suffer. And how can the court be asked to direct that the company shall make the charge of fifty cents per thousand feet uniform, when the agreement of facts admits that the actual cost to the company of the manufacture of gas is more than fifty cents? Such a decree would be practically confiscation of the company's property. Taking this view of the case it is unnecessary to consider the question as to the proper remedy for the complainants."

THE OHIO ASSOCIATION'S PROGRAMME.

We are in receipt of the programme for the sessions of the Ohio Association, whose members inaugurate their Third Annual Meeting at the Beckel House, in Dayton, to-day. Five sessions are arranged for, one evening assembly to take place at 7:30 o'clock this evening. Including President McMillin's inaugural address fourteen specially prepared papers are to be read, each of which will treat on a subject of interest and importance. An examination of the Secretary's final announcement admits of but one conclusion, which is that the lusty Ohio Association has prepared itself with care for a meeting in all respects calculated to outdo its former efforts, and the latter were entertaining in a high degree.

Mr. Dudley D. Flemming Resigns.

One peculiarity connected with the management of the United Gas Improvement Company seems to be its unwillingness to retain in its service those who evince a predilection to think for themselves. Slavish obedience to the snap of the whip constitutes virtue in the sight of the Company's controllers. The latest instance of the "nagging" process adopted by the Jersey City branch of the confederation is furnished in the resignation of Mr. Dudley D. Flemming, who retires from the service of a Company that he has faithfully served for many years.

Colonel Benson, the gallant Engineer of the Nassau Gas Light Company, of Brooklyn, N. Y., is once more at his post. His trip to Europe was of great benefit to him in every way.

The Cable bill "to punish fraudulent practices by officials of gas companies," was defeated, on the afternoon of March 8th, in the Ohio House of Assembly, by a vote of 4 for to 72 against.

The Yonkers, Municipal and Westchester Gas Light Companies, of Yonkers, N. Y., having entered the fold of the United Gas Improvement Company, the erstwhile happy gas consumers of that locality have been informed that from and after April 1st they will be obliged to pay $1.75 per thousand cubic feet for gas supplied them.

[Official Report.—Concluded from page 144.]

Seventeenth Annual Meeting of the New England Association of Gas Engineers.

Held at Young's Hotel, Boston, Mass., Feb. 16 and 17, 1887.

Second Day—Thursday, Feb. 17.—Morning Session.

*Discussion on Mr. F. S. Richardson's Paper.**

The President—Without having had any intimation of the contents of the paper, I think the remarks made when introducing Mr. Richardson were fully warranted by the facts which he has presented to us. I think it is one of the most, if not the most, interesting papers that we have heard read at this meeting. Its facts and figures come right home to all of us. We all have been putting forth our best efforts to produce a good quality of gas, and to sell it for illumination to the best advantage, and in a way to compete with every other light. I trust the paper will be thoroughly discussed by the members. I am sure Mr. Richardson will be glad to answer any questions that anyone may wish to ask him. I hope that those who have had experience in this direction will state it, and that those who have advice to give will give it.

Mr. Stiness—I am much pleased that another of our young men has entered the field of high candle power burners, and proposes to occupy it. I have had considerable experience with the Lungren burner, and it is identical with the experience of Mr. Richardson. I could not state it in language more accurate than our young friend from North Adams has done. I have, I think, gone a little further than he has done, for I put the Lungren burner in direct competition with an arc light, and it was afterwards stated by the business men of Pawtucket that either the arc light was not of 1,200 candle-power, or else the Lungren burner developed a duty far in excess of what I claimed for it. We have had, during the past few weeks, a "Mechanics' Exhibit" at Pawtucket. You know we have in our city a great diversity of manufacturers. For instance, the Conant Thread Company; the Slater Cotton Company, engaged in the manufacture of the very finest grades of lawns and shirtings; the Dunnel Manufacturing Company, manufacturers of curtain materials and prints; the Loraine Company, which makes a specialty of the very finest grade of dress goods; and D. Goff & Son, now the exclusive manufacturers of fine plush in this country. The exhibition above referred to was intended to display the goods of these and other manufacturers, and they desired to have the exhibition hall well lighted. The hall (it was larger than this room) originally contained two 6-light chandeliers. On the morning of the day fixed for the opening the managers came to me and said that on the night previous (when the goods to be displayed had been properly grouped) they did not have enough light. Tiers had been built up for the purpose of showing the various goods; and, of course, the tiers obstructed the light somewhat. Dark corners had been created. I immediately telegraphed to Philadelphia for two of the 16-candle power Lungren burners, and the following Sunday the reporter of the Providence *Journal*, in his report or description of the "Mechanics' Exhibit" (it was visited by 3,000 people, so you may judge it was of merit), said that "the enjoyment of the exhibit of manufactures is greatly enhanced by the magnificent light from the Siemens-Lungren regenerative gas burner furnished by the Pawtucket Gas Company." I consider that to be one of the very best enconiums that could be pronounced upon the lamp. It was entirely honest, unsought and unbought; and, further, it was the universally-expressed opinion of all those present that the room was splendidly lighted. In one of the rooms of the Business Men's Association (an association composed of 200 of the leading business men of our city) I have had, for many weeks, a 12-foot Lungren burner. It has received universal commendation. One has also been so placed in a store that you might say it was almost out of doors, for but a small portion of the store had any surrounding wall. They had used previously an arc light, but in its place we put a 16-foot Lungren burner, and the proprietor was decidedly of the opinion that to him the light was far more pleasing than that formerly given by the arc light. From the nature of the goods sold (it is a butter shop) the proprietor was a little afraid that during the summer the amount of heat generated from the burner would be a disadvantage. While I am ready to agree with Mr. Richardson that the price of the lamp at the present time may be considered a little high; yet, in my individual case, in several instances where I put them in, I have said to the parties, "If you want the burner it is yours to try; after you have used it a sufficient time to determine its merits, and then desire to purchase it, you can do so." In one case a storekeeper who had a very handsome chandelier in his place, said, "I dislike to take that down and throw it away." I replied, "I will exchange this burner for your chandelier." I know, from what he told me lately, that rather than have the burner taken down he would give away his chandelier and buy a Lungren. Such is the policy, I think, gas companies must pursue. The electric light people are pressing so hard and strong upon gas companies that the promoters will go into a shop, string their lights, and make no charge for the work. To many people that is quite an inducement to put in the incandescent light. All they have to pay is a fixed charge per month for the light. The incandescent consumer has not to pay for fixtures; in fact, he pays for nothing but the light. As said by me very many times, I think it is the true policy of gas companies to get out of the old ruts in which they have traveled, and get into new paths. They should assist in all ways and means to encourage the consumption of gas. I was rather pleased that Mr. Richardson also touched upon the subject of electric lighting. I have always maintained that that subject has never received from the New England Association of Gas Engineers the attention which its importance and merit demanded. The two systems of lighting can be and should be brought under one organization. As is well known to you I have always maintained that the title of "Gas Company" should be changed to that of "Artificial Light Company." It makes no difference to me which light I supply. If a consumer wants gas I furnish it; if he wants the electric light I give it to him. I think the subject is worthy the serious attention which Mr. Richardson's paper asks for it. I believe we should do all we can to increase our business, and strengthen the companies we represent, by urging the adoption of these improved burners—and also by the introduction and supply of any system of artificial lighting that the public demand. I submit that no one will dispute that at the present time the public do demand electric lighting.

Mr. Allyn—In Cambridge we are now introducing the Lungren light, and I desire to get what information I can from those who know more about it. I would like to inquire of Mr. Richardson whether it is the practice among those using the light to extinguish it or merely to turn it down to a glimmer, and allow it to so burn during the daytime. I find there seems to be a difference of opinion with regard to the best method. I believe that the almost universal practice in Hartford is to leave it burning in a slight glimmer during the daytime. I find that some are a little skeptical as to the amount of gas consumed during, say, the 15 or 18 hours when the light is turned down.

Mr. Richardson—I will say, in reply, that only three of our fifty odd lights are left burning with a glimmer. I think possibly if we were able to approach so near the dollar mark as our friend from Hartford has done I should recommend that all be left to burn with a glimmer; but excepting those which are burning in the hotel, and in the National Bank, I have recommended that they be set with a complete shut off; and I must say they light very easily. It is a fact that before placing them outside of the gas company's control every lamp should be kept burning in the office at least two days—unless you are pressed for their use—because the parts seem to yield quicker to the flame after they have been thus burned. The flame then spreads itself about the flame-plate without any delay, and you do not perceive the disagreeable odor that comes from the lamp when it is first lighted. I make it a practice to test the lamp on a test meter, and to burn it one or two nights before sending it out. I would recommend, save in exceptional cases, that they be not left burning.

Mr. Allyn—I am very much obliged to Mr. Richardson for his suggestion with regard to operating the lamps in the works before sending them out. I think it is an excellent plan, and overcomes one of the two objections made to this lamp. In every case where we have put up a Lungren burner the odor thrown out when the light is first started has been spoken of as objectionable; and we have been asked whether it is the general practice of the lamp to throw out such a smell. Of course, we always explain that it is caused by the new metal being heated up, and that it passes off in a short time. The other objection seems to be the difficulty experienced by some in lighting the burner. Considerable knack is required in lighting up one, especially when at a high elevation from the floor; but with a little experience this is overcome.

Mr. Richardson—When the lamp has been used for a short time they light very much easier than at first.

Mr. Stiness—Mayor Sayles, of our city, a member of the Business Men's Association, owns a very elegant mansion, and after I had operated that lamp in the rooms of the Association for a few days he said he wanted me to put one of those lamps in his hallway, provided it could be lighted by electricity, as every burner in his house is lighted in that way. I immediately entered into correspondence with the Siemens-Lungren Company on the subject, and they are now experimenting to see if the plan is a practicable one. The trustees of a large church in our city desired to put up four of the lamps, but they are placed at such an altitude that they must be lit by electricity, If the Company succeeds in the experiment it will be a very great help in introducing the burners. I hope they will succeed, for I consider there is a great field and a great future for that Company, for the gas companies, and for the public, in the introduction and use of the Lungren lamp.

Mr. Richardson—The fact stated by my paper with regard to our success in introducing the lamp is, I think, quite important. A large part of the North Adams gas consumption is in the mills, for the business portion of our city is not very extensive. We have a local electric lighting company

* For paper, see issue March 2, p. 143.

that is owned by the merchants (at least the portion I do not own myself), and they all use the light which they believe to be theirs. That, of course, takes from us a number of stores, many of which would otherwise use gas, Now, 50 or 55 Lungren lamps means, with us, a great deal when compared with the size of our town. We do not sell over sixteen million feet per annum, consequently the number of lamps that I have succeeded in selling is noteworthy. I have adopted the same plan of introducing them suggested by Mr. Stiness—that is, I hang the lamp, and if its working is satisfactory to the consumer he buys it. I think that is the only, or rather the best, way to force the lamp into use. When you get one or two hung in a small or a large room you may feel sure that they will never be taken out.

The President—Has Mr. Wood, of Syracuse, N. Y., had any experience with the Lungren lamp?

Mr. Wood—About as the gentlemen have related. The great difficulty I have experienced in introducing them is their cost. We have put in a dozen or fifteen, and these have given the best of satisfaction in every respect, except as to price.

Mr. Copp—I am sorry that Mr. Bill is not here to state what has been done at Malden; but as I am connected with the Company I will relate the results in connection with the subject under discussion. An electric light company visited Malden and canvassed for business. We welcomed them, for we knew they would be an incentive to the use of gas. The business community of Malden is not an extensive one, and the trade done is of a small retail nature. Up to the advent of the electricians the shopkeepers did not favor gas to any extent, for perhaps but eight or ten of the thirty or forty merchants used it in their stores. We were satisfied we had to do something to extend the use of gas; and to do so and to compete with electricity we introduced the Lungren burner. We have now about 100 Lungrens, varying in size from 8 to 16 feet per hour, in use. We have adopted the system of putting them in on rental. Our original idea was to put them in free, because the electric light was furnished without any rental charge for the lamp. The first man approached on the subject wanted to know what the Lungren lamp would cost him, and we made the rental charge equal to 50 cents per quarter. He was satisfied, and that has been established as the price. We placed them in a large number of stores, and have *sold* six or eight for use in private dwellings; but in no instance have we sold any of them to storekeepers, or those whom we might term commercial users. The lights have, as a general thing, given good satisfaction. We have had little or no complaint from the heat, and hardly any complaints from the lights. At Rockland, Me., we have a Lungren employed as a street lamp. The only trouble there is that the burner is too long to fit the lantern, which brings the flame too near the bottom of the lantern frame. So far as its use in that capacity is concerned it burns quite as perfectly on the street as it would in a room. We are perfectly satisfied with the introduction of the lamp in Malden. Many arc lights that had been put in stores have been displaced by Lungren lamps. In fact we found the Lungren burner to be a very excellent competitor with electricity, and while we have no desire to crush out the electric light company in Malden, we are very glad to take away from them all the business we can.

The President—I understand that Mr. Slater has had some experience with the Lungren lamps in Providence. Perhaps he would give us the benefit of that experience.

Mr. Slater—We have but a few Lungren lamps in use in Providence. The first were put up in the Post Office, which building was formerly lighted (I think for eighteen months), by Weston incandescent lamps, charged for at a very low rate. The incandescent light was originally put in under certain influences. At the end of about eighteen months, the Collector, (who is the custodian of the building for the Government), was replaced by a new official. At the termination of the original incandescent electric lighting contract, the company that had it proposed to raise the price, in fact, to double it. Proposals for lighting the building were invited; the Providence Gas Company put in a proposition, offering to furnish the Lungren lamps. We showed them to the Collector, who was very much pleased at the system, as also were the Post Office officials. The affair terminated in our securing the contract to light the building. In the first place, under the former plan, the space known as the "Lobby," formerly had seven two-burner pendants, each burner consuming six feet, or a total consumption per hour of eighty-four feet; and these, under the new system, were displaced by seven Lungren lamps of different sizes, varying according to the area to be lighted. These consumed ten or twelve feet per hour less than the quantity formerly taken up by the fourteen burners, and light the place very much better than it has ever been lighted before. A few weeks ago, one of our electric light companies was burned out, and for a few days could not supply any light. One of our consumers, who had been a large user of the incandescent light, came to us to know if we had any of those Lungrens. We told him we had five in the office at the time. He said he would like to have them put right up, and to send the bill in with them—he had seen the lamps burning in the Post Office. We put them up, and after two days he sent to us for two more of larger size. We put in four more, of large size, and he is using them still, although the electric light company has for some time been in condition to again supply the demands of consumers. We have also put them in in one or two other instances, which constitutes all the experience we have had so far with these lamps.

The President—Does Mr. Slater remember how many incandescent lights there were in the Post Office altogether?

Mr. Slater—No, I do not. In the working portion of the Post Office they still use the common flat flame burner.

Mr. Coffin—In the Business Men's room in Gloucester, we put up a 16-foot Lungren burner, which took the place of a four-light chandelier, and two Argand drop-lights. It suited the public and the patrons of the room so well that it attracted a good deal of attention. The agent of the electric light company claimed, so I was told, that it was an incandescent lamp.

Mr. Richardson—The suggestion made by Mr. Copp is a very important one to companies that have a surplus of money. A few thousand dollars can be put to no better use than in buying Lungren lamps, and renting them. Even if you cannot get more than fifty cents per quarter for their use, that figure will net you ten per cent. on the cost, while $1 per quarter will net you twenty per cent. You will make money on your investment, and the sales of gas will be doubled. I know of no better way in which a company can invest its surplus than to use a part of it in buying and renting Lungren lamps.

Mr. Nettleton—I would emphasize the point made by Mr. Copp, and reiterated by Mr. Richardson. It seems to me that with so expensive a burner as the Lungren, it will be often impossible to get people to try it, except we show our willingness to put our money in it. I think the companies that ask the people to buy it outright, and who are unwilling to furnish it on trial, will make very slow progress in its introduction. On the other hand, if we will only imitate the electric light companies who go to a man and say, "Won't you have the electric light? we will put you in the wires and the lamps; we will see that the lamps are kept cleaned; we will furnish and put in the carbons as required, and we will do everything needed for so much per year." I have tried during the past two months to introduce them in towns that I supply with gas, by offering to sell them at cost, or to rent them at $3 per year. So far I have met with fair success. I have now over thirty in use, and I shall be disappointed if, before the end of the year, the number is not materially increased.

Mr. Taber—It seems to me that the Lungren lamps will aid us to solve one problem that has hitherto been a bugbear in our business. The electric light companies are able to take a contract for supplying a store, an office or a house with light, at so much per year. Hitherto we have been unable to contract on any such terms. We sell our gas by the meter, at so much per thousand cubic feet. It seems to me it is possible, with this Lungren lamp, to know the maximum consumption, to estimate the number of hours which any one will use the lamp, and thus be able to meet the electric light companies on the same kind of contract system. In a case in New Bedford, where we tried to introduce one the other day, I made an offer to light a store for a little less than the electric incandescent supply would cost. In making the offer, I was perfectly sure that if it were accepted I should be selling the gas a little higher than our regular rates—taking as fair, the statement of the merchant about the hours that he would use the light. It seems to me by means of these lamps we can compete with the contract system of the electric light companies.

Mr. Stiness—Have we the same means of shutting off the light that the electric light companies possess?

Mr. Coggeshall—I have had some experience with the contract system. There is a store in my town in which there had been six arc lights. They said they would burn gas if they could make a contract for a certain definite sum of money. They agreed to burn the light only a certain number of hours, and I agreed to light the store for a certain sum. During the past winter, on several cold days, I have passed that store when every light was going. I had my inspector visit that place for six days, in order to see how much was the day consumption, and he found they consumed a thousand feet each day.

Mr. Todd—I represent a very small company—the Natick. I put in some of those Lungren lamps about a year ago. The electric light people told most of the gas consumers that the electric light was much cheaper than gas—the price of our gas is $2.85. I figured out what it would cost to run the Lungren lamps during the hours in which the different stores were kept open. I found, for instance, one store would average during the year about four hours per night, for six nights each week; another would average three hours per night; some others would average but two and one-half hours per night, on five nights per week. I sent to each of those consumers a statement of just what it ought to cost them to operate the lamps for a year, at $2.85 per thousand cubic feet for the gas. A 100-candle power lamp, using eight feet per hour, three hours per night, six nights per week, would in a year burn 7,488 cubic feet of gas, which at $2.85 per thousand made the an-

nual expense foot up $21.33. A 150-candle power lamp burning twelve feet per hour, would cost $32 per year; and a 200-candle power lamp $42 per year. I rent the lamps at $4 per year. The lamps cost us delivered, including freight charges from Philadelphia, $24.50 each. To those who wished to buy, rather than carry so many lamps we threw off the $4.50 and sold them for $20. We have ten in use now, and one or two more are ordered. The local electric light company finds its business pressed pretty hard, I am afraid rather too hard for its own good. The electric light company when starting in attempted to persuade our consumers that, for the interest of the public, they should patronize the new light, and a number of them did so. They were obliged to contract to take the light for a year, which period, in a number of instances, terminates on April 1st. To show what may be the outcome, I may say I have orders now on hand to put in two or three Lungren lamps, in place of as many electric lights when the contracts for the latter terminate, and I believe that we shall have a few more like orders before the 1st of April.

Mr. Prichard—I wish to say a word (which is brought to my mind by Mr. Stiness's remarks in regard to the use of the electric light in a butter store) about the nature or quality of the light from the Lungren lamp. My idea is that the Lungren lamp light is just white enough to be particularly economical. It furnishes rays of the precise colors best adapted to light the interior of a room. In looking around a room so lighted you will probably find that the prevailing colors are white and red, or the lower rays of the spectrum, and that there are but very few of the upper, or bluish rays, so prominent in situations where the arc light is employed. The result of all this ought to be, theoretically, that the butter merchant who lights his store with a Lungren lamp will have brought out in strong relief the rich yellow of the butter, and thus may make it look 10 cents per pound better than it did when it was displayed by the agency of the arc. And it is just so with any interior. The arc light may furnish like volumes of yellow and red rays; but it will also develop a proportion of blue and indigo rays so far in excess that the latter overshadow the red rays, thus producing an unnatural effect. I think the Lungren burner just fills the requisite of economy in illumination that I tried to portray in my paper.

On motion of Mr. Nettleton the thanks of the Association were voted to Mr. Richardson.

Report of Committee on President's Address.

Mr. Stedman, from the Committee on President's Address, read the following report:

The Committee to whom was referred the President's address beg to report that the particular point requiring action on the part of the Association is the recommendation in regard to creating a class of Associate Members. The Committee unanimously approve the action so recommended, and advise the adoption of an additional article to the Constitution authorizing this Association to elect Associate Members, and defining the status of such members when elected.

They further recommend that a committee be appointed to prepare the necessary additional article to the Constitution, and to present the same in time for action at the next annual meeting. Also, that the same committee be requested to prepare amendments to any articles of the Constitution which, in their opinion, may be improved in explicitness and clearness of meaning by such amendments, and submit the same as above.

For the Committee,

W. A. Stedman, Chairman.

Mr. Stedman, in addition to the formal report as above, said: The Committee have particular reference, in that recommendation, to Article XIII. of the Constitution, which defines the way in which its provisions may be amended or altered. That article reads as follows:

"These articles may be altered or amended at any annual meeting, notice of such proposed change having been given at least one fortnight previous to such meeting."

The article does not define to whom or in what manner such notice shall be given; therefore it was thought by the Committee desirable make it more definite, especially as, on a previous occasion, there was a little hitch in making a proposed amendment, in consequence of notice not having been given to the members. Therefore the Committee recommend the insertion of a clause defining when notice shall be given, how it shall be given, and to whom it shall be sent.

Mr. Taber—I move the report be accepted, the recommendations of the Committee adopted, and that the committee be appointed by the Chair. (Agreed to.)

Appointment of the Committee.

The President—I will appoint on that committee Col. Stedman, Mr. F. C. Sherman, and Mr. D. W. Crafts. I would suggest to the committee that their report be prepared at least 30 days before the next annual meeting, and forwarded to the Secretary, so that he may print and mail a copy of it to each member of the Association, in order that they may know just what amendments to the Constitution are proposed, and that when we come together next year we may be prepared to take action thereon. If the committee will accept the suggestion, and bear it in mind, I think it will facilitate matters at that time.

Associate Members.

Mr. Taber—If this amendment to the Constitution is adopted at the next annual meeting would we be able, at that meeting, to elect associate members?

The President—The opinion of the Chair would be, if the report of the Committee be accepted, and such amendment be adopted by vote of this Association, that gentlemen who might then apply for election as associate members, if approved by the Board of Directors, could be admitted at the next meeting.

Mr. Cabot—A gentleman from Rhode Island spoke last evening about the importance of having the directors of gas companies present at our meetings, and the suggestion seemed to me to be very appropriate. I do not think the directors of our corporations are as familiar with the details of gas manufacturing as they should be. Perhaps some of them are as familiar with the details as they want to be; still I think, if they could be induced to attend our meetings, they would be very much interested, and they would also discover how important it is for their agents to be in attendance at these gatherings. If there is any way in which that could be brought about either by an invitation given to them to be present at our discussions, or through some arrangement by which the corporations could become members, and send one or two delegates to our meeting, I think it desirable that it should be done. Perhaps the directors themselves might not want to become members, but they might be desirous of appointing some one of their number a representative to be present at our sessions. In such event they would become more interested in our proceedings than they now are, although I think we have made a great deal of an advance in that direction in the last five or ten years. There was a time when the directors thought it was merely for a "jollification" that the members of this Association held their annual meetings in Boston; and a good many of them rather regretted we took that opportunity to leave our business. I think something may be done by which we can reach those gentlemen, and induce them to be present at our meetings, and I feel that such attendance would be useful not only to them but also to their agents. I make the suggestion while this matter from the committee is before us, hoping that someone may propose the means for carrying it out.

The President—I think Mr. Cabot's suggestion is well made. Personally I have no doubt at all but that if the directors of gas companies were more familiar with the doings of the Association they would perhaps have more confidence in the advantages to be derived by the managers of gas companies who attend the meetings. I have personally tried to interest the members of the Hartford Company's board of direction in the matter, and have done it in this way. Two or three years ago I sent a check to the publishers of the American Gas Light Journal, in New York, directing that a copy of the paper be mailed to each member of the board of direction. I have kept up that custom of having them supplied with the paper, and have invited some of the gentlemen to attend this meeting. Unfortunately they could not come. I think there are two ways in which they can be reached—either by invitation of our members to individuals of the boards; or, as has been suggested, by having the constitution so amended that they may become associate members. The subject is one worthy of consideration, and when we come together next year, if we decide to amend the Constitution so as to admit associate members, perhaps some provision can be made to carry out this suggestion.

Committee on Memorials.

A matter recurs to me which was overlooked yesterday. It is the appointment of a committee to prepare a memorial in regard to the deaths of two of our members—Mr. W. C. Taber, of New Bedford, Mass., and Dr. Estes Howe, of Cambridge, Mass.—who departed this life during the past year. It is proper that that should be done; and, with the permission of the Association, I will appoint as such committee Messrs. Stiness, Cabot and Allyn, and request them to send suitable minutes promptly to the Journal, so that they may be published as a part of the proceedings of this meeting. Unless some objection is made that will be the order; and the gentlemen named will kindly accept the duty and give it their usual prompt attention. The committee appointed to prepare a minute on the death of Mr. Wm. J. Miller, of Bristol, R. I., will also send their report in the same way, and kindly attend to it at once. [For report, see page 179.]

The Question-Box.

We have now completed our regular programme, at least so far as the reading of papers is concerned, and unless some member has other business to bring forward we will open the Question-Box and determine what it contains for our information.

The first query is—

"*What is the best way to prevent a gas main laid across a stone culvert from being stopped up in the winter?*"

Some of the members who have laid mains over or through bridges or culverts will kindly give us the benefit of their experience, and suggest a remedy to our friend who asks this question.

Mr. Cabot—Many years ago I had occasion to lay a main over a culvert, which subsequently gave us trouble, and I finally took it up in order to overcome the difficulty. I placed a larger pipe around the main, which permitted a circulation of air between the outer pipe and the main; and that seemed to overcome the annoyance, for I never heard of any trouble there since.

The President—Will Mr. Cabot state the depth of soil covering on the pipe, and what on the top of the culvert?

Mr. Cabot—Between 3 and 4 feet. The top of the sewer was about 4½ feet below the surface, and the pipe rested on the sewer.

Mr. Leach—I have done the same thing in open culverts, and have never had any trouble at all. I have also used the same means on my lamp posts—using a larger sized pipe for a frost-jacket. I now have no trouble from frozen lamp posts.

Mr. Coffin—We had an experience very similar to that of Mr. Cabot, but we boxed the pipe and packed it in with tan. We have not been bothered with it since.

Mr. Jones—Some time ago a friend of mine called my attention to lampblack as a non-conductor. He told me he had laid pipes in boxes and then packed lampblack around the pipe. The system hindered the formation of deposits and prevented the freezing of water in the pipes. He said that steam pipes so packed would not melt snow on the top of the ground; in fact, that they did not even thaw the ground about the box appreciably. He thought it was one of the best non-conductors he had ever seen, and not very expensive.

Mr. Moore—We were obliged to carry a pipe (we passed it through a larger pipe) over a culvert, but a short time ago the gas stopped, and on tapping it we found it was frozen solid. In consequence the explanation so far given does not help us any. The jacketing plan was of no use in the case of a pipe 18 inches below the surface in a place where the earth was frozen to a depth of 4 feet.

The President—How does Mr. Moore think the solid ice came there?

Mr. Moore—By condensation; and in no other way.

Mr. Humphreys—I have covered several pipes so situated with regular steam pipe covering—that is, with a layer of asbestos paper, hair felting next, and then asbestos paper again, and canvass over all, finished with a thorough coat of paint. We have, within the past two years, covered six or seven such pipes in that way, and have had no trouble with them since. Where elbows are met we use, if we can, an outside elbow two or three sizes larger, and run the gas through that. We have found it a great benefit. It gives the gas a chance to expand. The gas passing into the larger elbow does not seem to have the tendency to freeze that it has with the regular size of elbow.

Mr. Prichard—From some of my past experience I think the best remedy is to enlarge the pipe. The main point to be observed is to pack at the point of contact with the frozen ground, or in the wall. The point where the pipe touches the wall seems to be so intensely cold that everything catches in it at that point; and if the pipe can be packed along for four or five feet it does not seem to fill up. I once had that experience in the West with a pipe that crossed a bridge. The pipe froze as it came through the wall; but by covering it with a box at a point two feet from the wall, and into the wall for two feet, the trouble was remedied.

The President—I trust, from the suggestions made, Mr. Moore will see some point that will enable him to overcome his difficulty. The next question is—

"*How many cubic feet of gas is represented by one cubic foot of retort carbon?*"

Mr. Stedman—The question is not quite clear, to my mind. Does it mean to convey the idea that the gas is diminished in volume by the deposit of carbon on the retort? I would take the ground that it would very probably increase the volume. It is quite possible to split up some molecules of gas that are very rich in hydrocarbons and, by doing so, double their bulk. Some of the gentlemen who visited Pittsburgh after the Philadelphia session of the American Association saw a process of decomposing the natural gas in the presence of incandescent coal, thereafter enriching the products of the decomposition with naphtha and crude oil, or with any rich kind of carbon or oil, which greatly increased the bulk, not only of the gas after it had been enriched, but before it had reached the enriching stage at all. In fact, by passing it through a meter it was found that it had nearly doubled over the bulk of the quantity of natural gas first worked on. A very large proportion of the natural gas consisted of marsh gas; and the supposition was that in presence of the coal it was decomposed and split up—one volume of marsh gas being split into two volumes. If that was true in that case, it might be true with any gas rich in hydrocarbons, coming in contact with the hot surface of the retort, that a portion of the carbons may be extracted, allowing the molecules to be split up, or making two volumes out of one, thus doubling the bulk.

Mr. Taber—I hope no member will go home and try the manufacture of gas carbon, because, even if we are going to double the volume of gas, it seems to me that by breaking up the particles of marsh gas and leaving the carbon on the wall of your retort you may get some hydrogen into your gas, but you will not get any light from it.

Mr. Neal—I find it quite profitable to manufacture retort carbon, because, having removed it by using coarse salt for several hours, if it is then put into the generator it yields about 45,000 feet of water gas per ton, which, when enriched with naphtha, goes out and is utilized as illuminating gas. I use all the retort carbon made by us at Charlestown in that way—in the regenerators of my water gas plant; and when I have no retort carbon to use I use coke. We put the coal into the retorts, get all the gas out of it that we can, and then put the residuals into the generator and get 45,000 or 50,000 feet more.

The President—What does Mr. Neal think would be the value per ton of retort carbon as compared with coke?

Mr. Neal—About the same, with coke at $3 per ton in the yard.

Mr. Allyn—When you speak of 45,000 feet, you mean to the ton of carbon?

Mr. Neal—Yes, sir.

The President—The next question is—

"*How much coke is used, by measure, to carbonize 2,240 pounds of coal, with yield per pound?*"

I think that, perhaps of all the members of the Association, the best able to answer this question is Mr. Stiness, of Pawtucket R. I.

Mr. Stiness—I feel that that is an important question, but am a little sorry the coke question has been sprung upon the Association at this hour. I read in a Boston paper that a professor of Harvard University, under the dome of the State House of the good old Commonwealth of Massachusetts, stated that coke would not heat water and produce steam which would drive a dynamo, to produce the electric light; and I thereupon said to myself, "If it won't make steam, what is coke good for?" I think Colonel Stedman spoke my sentiments last night when he said, after reading that remark, that he was thankful this matter was going to come into the hands of practical men. As to the question, some time before this meeting my attention was called to the results—which, to me, were remarkable—obtained at the Pawtucket works, as compared with those of former years. These were obtained by the introduction of a regenerative furnace, (not a recuperative one, but a small regenerative furnace of the Dieterich pattern), and desiring to know whether I was securing results that were marked in their character, I sent out some questions and statements. I instantly ran upon a snag in the coke question. I took, as an arbitrary basis of figuring, 36 bushels of coke as being the product of 2,240 pounds of coal. I was immediately met by a response from one of my good friends that I must take 42 bushels as my standard. Then, again, friend Greenough said the standard was 42 bushels, of 45 pounds weight to the bushel. So I said, 42 bushels of coke at 45 pounds to the bushel, 12,500 cubic feet of gas, from 10 to 15 gallons of tar, with a certain quantity of ammonia, and I was in the predicament of the Indian who was allowed to have three wishes. His first wish was for rum; his second was for tobacco; but when he came to the third wish he did not know exactly what to wish for, and so he concluded that he would have a little more rum. So, in my case, with the 42 bushels of coke, 45 pounds to the bushel, the 12,500 cubic feet of gas, with the ammonia, and other incidentals—and they all weigh something—I thought I ought to have a little more coal. To determine the matter, I carefully weighed 990 pounds of coal into three retorts. The coal, after remaining four hours in the retorts, was drawn, hauled and deposited in a place in the yard that was paved with a concrete floor, and measured—and it was measured carefully. The product was 18 bushels of coke, which equals 40.73 bushels to 2,240 pounds of coal. In some other experiments I found that the carbonization of 30,475 pounds of coal left for sale 375 bushels of coke. The 30,475 pounds equals 13¾ tons of coal in round figures, which which makes 540 bushels. The 375 bushels of merchantable coke (without any fine coke or dust measured at all) gave 165 bushels of coke as the amount consumed in the furnace, and the gas product equalled 167,000 cubic feet. This gives 12½ bushels of coke to carbonize 2,240 pounds of coal. I then took another bench with a good furnace, and in this connection let me say, that I selected an ordinary working day, with its missed charges, and when the furnace was not worked to its full capacity, for I considered that such a day would give perhaps a more exact statement of the average working, and charged it with 5,966 pounds of coal, which produced 106 bushels of coke. There were 74 bushels of coke left for sale, which, reduced to bushels of coke per ton of coal carbonized, was 12. Then I made another experiment with the same six benches, with 35 retorts, and found that I used 31,544 pounds of coal, and produced (at

the 40 bushels to the ton ratio, which I accepted for the time as a standard, but which I do not adopt in my own works), 564 bushels of coke. There was left for sale 372 bushels, so that 192 bushels of coke was used to produce 174,000 cubic feet of gas; which would equal, I think, 13½ bushels to the ton of coal carbonized. That was done in what is termed the Dieterich furnace. My only reason for making those experiments was—as there are to-day other furnaces presented for our consideration, and as I feel that by the use of the Dieterich furnace I can, from what knowledge I possess, produce as much gas per month-piece, and as much gas per pound of coal, as I could with any other furnace—to discover whether I was working as economically as I ought, in the amount of coke consumed. I have taken here, as you gentlemen to whom I have given the figures remember, the arbitrary standard of 40 bushels of coke to the ton of coal. If these figures be increased to 42 bushels, the quantity of coke consumed will be increased. If one figures, as an article of merchantable coke for sale, on 36 bushels, of course my results are very much better still. I give you these figures as the practical, every day workings of a retort house. Some of the retorts that I am now using have been constantly employed for more than 20 months, and they are good to-day for 10,000 feet each 24 hours. I think, as I said before, if coke is so perfectly worthless that it cannot heat water and make steam, then perhaps we had better let this question go, and find some other more profitable item; but during the past few months, when every gas company has been put to its wits end to furnish its customers with the amount of coke they wanted, it seems to me a very important matter. If there is any furnace to-day which will carbonize 2,240 pounds of coal with any less coke than that used by the Dieterich furnace, I would be very much pleased to be told of it.

The President—We have had a very interesting statement from Mr. Stiness. Mr. Nettleton has been at work on this matter for some time, and we would like to hear what he has to say in answer to this question.

Mr. Nettleton—As I was one of those who received a letter from Mr. Stiness, perhaps it is fair that I should speak immediately after him. When he kindly sent me the figures that he did I was struck with the marvellous success he had met with. That was apparent on the face of it. I then set to work figuring the matter out, and I came to the conclusion (and I think all of you will join me in it if you will take the trouble to figure out the result) that those figures are not equalled to-day anywhere in this country, and that we have never yet had reports from any gas works in Europe of their being equalled, with a simple regenerative furnace. Mr. Stiness has stated it perhaps more modestly than he ought. On the basis of his statement he sells 27.7 bushels of coke to the ton. After allowing 70 feet of gas per gallon of oil used, he makes a yield of 5.40 feet per pound of coal. For a simple regenerative furnace I do not think that work has been equalled. I take a great deal of interest in this subject. I am one of those who are trying to solve the dollar problem, and hope to live long enough to accomplish it. I do not believe it can be done except by saving the largest possible quantity of our residuals, and selling them for the very highest price. In that connection I desire to say that I know of one gas works where they sell—absolutely sell—34 bushels, of 2747 cu. in. each, of coke to the ton of 2,240 pounds. Of course, this is not done with a simple regenerative furnace; it is one of the elaborate recuperative ones. I think it is possible for most of us to sell 30 bushels of coke to the ton. I know of works on the seaboard, and competing with cheap coal, where nine cents per bushel of coke is received in the yard; that, for 30 bushels, would be $2.70. I know of other works where they get 70 cents per ton for tar; I know of other works where they get 25 cents for ammonia. Together these amount to $3.65. If coal costs $4, the difference is 35 cents, or 3½ cents per thousand feet. In addition to this economy the introduction of these furnaces has greatly cheapened the cost of labor. In my own works I have for a month past made nearly 27,000 feet per man; and these men have brought in the coal, charged the retorts, taken care of the furnaces, taken the coke into the yard and piled it, and run the boiler; and one of them very willingly said he thought it would be about as easy for him to put 2,000 pounds into the six retorts as to put 1,800 pounds. I believe it is only in following this furnace question, with all it involves, out to its utmost limit we can ever hope to solve the dollar problem.

The President—Col. Stedman has had large experience in this direction, and we would like to hear from him.

Mr. Stedman—I do not know that I have anything new to offer, in addition to what I have said hitherto. I have not made any careful experiments with regard to the amount of coke used during the last year at all; and I do not know that I can impart any information about it. It seems to me very plain, however, that the regenerative furnace is generally accepted as being exceedingly economical with fuel as compared with the old fashioned furnaces, and, consequently, I suppose that they will be very generally introduced sooner or later. The other obvious advantage of the regenerative furnace is the ease of management, and the steadiness of heat maintained. The question of coke is one that has to be solved by nearly every person, under his own peculiar conditions of production and sale. While we may bring 42 bushels of coke into the yard from a ton of coal, and, by carefully measuring it up into standard bushels, ascertain exactly its bulk according to the government standard, yet, in my experience, there is always a considerable diminution of bulk whenever the coke is handled. Generally your workmen are inclined to the charitable side of the question when they measure a bushel for a customer who comes into the yard with his wheelbarrow after it, and it is pretty difficult to determine, unless the coke is binned every day with the determination that so many bushels shall come out of that bin, to be able to sell as many bushels to the ton as you know you ought to sell, and as you know that you are producing for sale. Before this year we have always piled up the coke in the yard during the months of August, September, and October, when our greatest consumption occurred, and the lowest sale of coke was also incident to the same period, consequently we found, upon the commencement of cold weather, that we would have from 10,000 to 15,000 bushels o coke in stack to freeze and thaw, and consequently disintegrate, and leave u with an enormous pile of breeze when we came to clean it up in the spring. To obviate that difficulty, when we moved to the new works, we had left upon the old place quite a large coal shed, which we took down and carried to the new location, and put up there a coke shed capable of holding about 40,00 bushels under cover. The intention is to take the coke during the times o greatest production, pass it through the breaker, and store it in the differen bins intended to contain the different sizes, so as to have it ready for sale, when the larger demand for coke comes in the spring, at a period of the year when our production of coke is smallest. I think by this means the amount of coke that we will sell will be greatly increased. We have located the crusher about thirty feet high from the ground, and connected with the crusher is the ordinary revolving screen—the different sizes of the screen being located over different bins—so that as the coke is lifted to the crusher and comes into the screen it first passes into a screen with a quarter-inch mesh, which takes out the breeze; the next screen has a three-quarter-inch mesh, which deposits in its bin what we call the pea coke, generally sold for one cent less than common coke. The next bin is our prepared or stove size, which is passed through a two-inch mesh. The next bin contains the c ke that is rejected from all the screens and has not been sufficiently broken to pass through any. We sell that as common coke. The prepared coke sells for two cents per bushel more than the common coke, and the pea coke for one cent per bushel less than the common coke. Our prices are ten, eight, and seven cents. I hope to greatly increase the book account of the amount of coke sold at the end of the year by reason of the saving which I think we will effect in keeping our coke stored during the inclement weather from the action of the frost, snow and ice. I question whether it would not be good policy for those situated as we were—liable to have a large amount of coke to store during the severe weather—to have some kind of shelter to protect the coke from the action of snow, frost and rain. I know that has been a serious loss for us year after year. The regenerative furnace claims to yield (in some cases) as high as 33 bushels of coke per ton for sale. I believe there is one instance on record in this country where, after a careful account for a month, that has been determined to have been the exact amount—or rather between 33 and 34 bushels had been sold from a ton of coal daily. In this case the sale was quick, and there was no remeasuring; the coke was drawn from the retort into carts and taken away immediately. That represents a low consumption of coke, and is a pretty large sale. If we could average ten cents per bushel for the coke, 70 cents for the tar, and 50 cents for the ammonia, and our coal cost us only $3.50, we would then begin to solve the dollar problem.

The President—It is quite encouarging to know that the dollar rate is near at hand. It must be very encouraging not only for gas companies, but for consumers as well. I think that Mr. Lamson can give us some valuable information on that point.

Mr. Lamson—I have no figures of the kind. In the furnace which has the most interest for me at the present time we are using from 60 to 70 bushels of coke every 24 hours, and are carbonizing in the six retorts heated by that furnace 2,000 pounds of coal every four hours—the make of gas (using naphtha, but not counting it in) is about 5.15 to the pound—which is in the vicinity of 12 bushels to carbonize each ton of 2,240 pounds. We count 42 bushels of coke to the ton of coal, and 45 pounds to the bushel. That standard is the result of a great number of experiments made during many years, and carried out in very similar manner to that described by Mr. Stiness.

The President—The experiments were made on Westmoreland coal?

Mr. Lamson—Yes.

Mr. Stiness—What furnace do you speak of?

Mr. Lamson—One that we got up ourselves, and have used for a good many years. At the Commercial Point station we are using some furnaces of another sort. We originally heated seven retorts, but we now heat six large retorts. These furnaces would very easily carbonize over 2,000 pounds of coal in four hours, but we have not as yet been able to satisfy ourselves that the retorts would stand the heat sufficiently to carbonize the larger

charges. We charge 333 pounds to a retort, and have experimented with 350 pounds. The furnaces worked the gas off from that quantity pretty well, but the practice showed an injury to the retort settings.

The President—Probably Captain White has had as much experience in this line as any of us, and we would like to hear the result of his experiments.

Mr. White—I do not believe that the gentlemen would care to hear anything from me upon that subject, because I am not running gas works possessed of any modern furnaces. The information I have is simply that gathered in visiting various works, therefore I can relate nothing from my own personal experience. I have listened to the gentlemen who were speaking, and believe it is a fair thing to say that anywhere from 15 to 16 bushels of coke per ton of coal carbonized would be a fair average. Some engineers say they can get along with 12 bushels; but those are very few in number. In fact it is likely the greater portion of the fraternity does not manage to come anywhere near to the 15 bushel figure even. I have great diffidence in offering any opinion on the subject from the fact that I am not operating a gas works equipped with modern furnaces.

Mr. Jones—Did I understand Mr. Lamson to say that he got a yield of 42 bushels of coke, of 45 pounds per bushel, from a ton of 2,240 pounds of coal?

Mr. Lamson—Yes.

Mr. Jones—That would be 1,890 pounds of coke. Mr. Lamson says he gets 5.15 cubic feet to the pound of coal; but suppose we figure on a yield of 5 feet; that would equal 11,200 cubic feet to the ton of coal. Now, his gas would probably weigh 40 pounds to the thousand—an 18 or 19-candle gas ought to weigh a little more than that—or a total weight of 448 pounds of gas. Adding the 448 pounds of gas to the 1,890 pounds of coke, and we have 2,338 pounds of gas and coke from the distillation of 2,240 pounds of coal. Let us suppose the gentleman also gets 10 gallons of tar—which would weigh something; and there must probably be two or three pounds of ammonia in the liquor flowing from the hydraulic main; the sulphur ought also to contribute a trifle in the matter of weight. In view of these figures I am inclined to say with Brother Stiness that we ought to have a little more coal.

Mr. Lamson—That may be all very well; but when you take a statement you ought to take it as a whole. When I told you that I made 5.15 to the pound of coal, I took pains to add that we put in a little naphtha, and did not take any account of it. You must not draw conclusions from my figures unless you take the whole of them.

Mr. Jones—I figured at 5 feet to the pound, and the coke and gas alone would amount to more than 2,240 pounds.

Mr. Lamson—Then you figured wrongly. I can show you experiment after experiment, made with the greatest care, which gave us 42 bushels to the ton, of 45 pounds to the bushel. In order to verify the results, those experiments have gone into the hands of as many as four different men—each acting entirely independent of the others—and, at times, carried on by two different men at the one period, but at different stations of our company, in order to satisfy ourselves that no errors were made; the books of our company are carried out on those figures.

Mr. Prichard—I suppose there must be a waste in quenching coke which would tend to make a discrepancy.

Mr. Lamson—The question of water is, of course, a very material one, but in our Boston experiments, likewise in experiments of this kind made by others, the experimenter takes all such things into consideration. In our case, a certain length of time, a definite fixed period, has been allowed for this water to settle away from the coke. I think that in most of the experiments 24 hours have been allowed for that settling. In fact, the experiments have been carried much farther that, for we have taken coke which had been standing for from 24 hours to 6 weeks.

Mr. Stiness—I understood from Mr. Lamson's statement that he estimated on dry coke. In making my figures, I calculated them on dry coke. If he figures upon wet coke, of course I can understand where a discrepancy might come in; still, it seems to me that in twenty-four hours the coke would evaporate a good deal of water.

Mr. Lamson—What is dry coke? You would not take coke which was drawn out to-day and never quenched?

Mr. Stiness—The experiments made by the Guild of Gas Managers were with hot coke; and, as already said, my information came from dry coke. As intimated before, I did not question the quantity (42 bushels) of coke so much as I did the weight.

Mr. Allyn—You may remember, Mr. President, that some two or three years ago I read a paper before the Association on this very subject—the yield of coke per ton of coal—and in it I gave a number of illustrations to cover the point now being discussed, that it was absolutely impossible to make an accurate test if any water had been thrown upon the coke after it came from the retorts, and before the weighing was done. I claimed that the only absolute method was to weigh the coke as quickly as possible after it came from the retorts. In our experiments we ran the coke right on to a scale as soon as it was drawn from the retort, and weighed it there. I found that, using the smallest quantity of water we could to quench the coke, and allowing it to lay for days in the warmest season of the year, it would retain a large quantity of water. I determined this by making a small, but very careful experiment. I took a piece of coke, laid it on a steam radiator, left it there for 24 hours, and then reduced it until it weighed, on a post office scale or balance, exactly one pound. I then put it into a basin of water, allowed it to remain immersed for 15 minutes; when I re-weighed it, I found that it weighed exactly 1¼ pounds, which showed that it had absorbed 75 per cent. of its own weight of water.

Mr. Nettleton—Some years ago, in making some experiments as to the quantity of water that could be evaporated in a boiler by different fuels, I went into the matter of evaporation by coke quite carefully. The coke was taken from a pile which was exposed, or which had not been covered by a shed. That coke, running through 72 hours, averaged 38.8 pounds to the bushel. It is but fair to add that it was in the summer time, and there had been no rain for weeks..

The President—I think we have pretty thoroughly covered the question, and I trust that the gentleman who asked it feels pretty well satisfied with the answers. We have one other question remaining. It is:—

"*Can a gas company afford to devote its attention to electric lighting?*

That matter has been alluded to several times during our discussions, and if we are to get any further light upon the subject, now is the time.

Mr. Neal—Certainly; as the manager of a company which is lighting by electricity as well as gas, I answer that it can. Especially so if its charter is so framed that it can combine both kinds of business in one management, and so not be obliged to organize outside, as many companies have had to do. To remedy that difficulty, many of the gas companies are now before the legislature asking for a change in the law which shall authorize them to carry on the supply of electric light in connection with the gas business. The company of which I am the manager has been in the business just five months; and, as I tell those who ask me about it, I have no larger salary than I had before; I did not have to put any more furniture into my office; I have no more bookkeepers, no more collectors, no more men at the boilers—in fact, I have had to employ only four or five persons in addition to those who were originally employed in the gas works. The added helpers are a trimmer, engineer, linemen and patrol men. I suppose you all know that at Charlestown we bought the line and structures of the Weston Company. They offered to sell almost before we approached them on the subject, so that everything was perfectly harmonious. We did not attempt to raid upon them at all. We at once assumed the electric lighting, and instead of endeavoring to stand in the way of furnishing electric light, or to induce all our customers to burn gas solely, we attempted to enlarge our business by electric lighting, and have more than doubled the number of lamps that were then in use. We have a three-year contract with the city to furnish electric lights for lighting the streets. I answer that question most positively by saying that a gas company can afford to give its attention to electric lighting, in connection with its gas business, provided the field is clear. I cannot say what it might be if competition existed, in the shape of a local electric company, because then the rates might be so reduced that it would not be a paying business; but where one holds the field, as we do, the business can be done to very great advantage.

The President—Can it be done with profit to the stockholders of the Company?

Mr. Neal—It is done with profit to the stockholders of the Charlestown Gas Company.

Mr. Prichard—What prices do you get?

Mr. Neal—We get 65 cents per night, for every night in the year, by our street contract. For the commercial lights, which burn until about ten or twelve o'clock, we get 50 cents. For some private lights that burn all night we get 75 cents a night. Some of the railroad companies are paying that. For two lights we get 70 cents; for three, 65 cents; for four 60 cents; and for quite a number the rate would be 50 cents. We conform to the Boston rate as nearly as possible.

The President—Are there any Lungren lamps in use in Charlestown? Has the Company given them any attention?

Mr. Neal—Not at all. We should do so most certainly were we not in the electric light business.

The President—I want to ask Mr. Neal a practical question as to that very point. It is this: Whether if the manager of the Charlestown Gas Company had given the same energy and attention to the subject of introducing and using the Lungren lamp which he has given to introducing electric light, the results would not have been quite as good to his stockholders, and quite as satisfactory to the people?

Mr. Neal—By no means, because I do not think it would be possible to introduce the Lungren lamp for street lighting.

The President—But aside from street lighting—for general use among your consumers, leaving the matter of street lighting out of consideration?

Mr. Neal—I do not. It is true we have to furnish our plants in stores, to provide for the running of wires, and also to furnish a cut-off box on the outside of the building, or in some convenient place; but if we were furnishing the Lungren lamps, very likely we should do the same thing at less expense. Some of the lamps which we put in stores cost $65 each.

Mr. Prichard—How many commercial lamps have you?

Mr. Neal—We have 39 city lamps now, and in all we have fifty. The only reason why we do not put in more is because our plant is not sufficient. We are now arranging to enlarge the plant, and to move our dynamos and engine from the condenser room (where they were placed first, as an experiment) into a separate building.

Mr. Greenough—Does Mr. Neal propose to develop his electric lighting business at the expense of his gas plant, because he thinks there is more money in it?

Mr. Neal—In some cases there is more money—that is, where people *will have* the electric light. If we did not give people the light when they desire it, it is very likely that another company would come in and take that business from us. I think there is a very handsome profit in electric lighting when carried on by gas companies; and I am surprised to learn what was said at the State House the other day in relation to coke. I am surprised that a Harvard professor should make such a statement as the one reported—that you cannot generate steam to advantage for electric light purposes with coke. We have done that very thing for five months, and to very good advantage. I also heard it was given in testimony at the hearing at the State House that it was impossible to generate steam for ordinary purposes with coke. All the gas companies in the land have done so for years; in fact, they have done so ever since the introduction of gas as an illuminant.

The President—Can any other gentleman express an opinion upon this subject founded on his experience? We have had lots of theory.

Mr. Stiness—Whether Mr. Neal is correct or not in his theory, I believe he is absolutely correct in his facts. I heartily agree with everything that he has said. The question asked is a practical one, and he answers it by saying that he does not extend his electric light at the expense of the gas company, but that he controls the consumption of both, which, in my opinion, is a very important point.

Mr. Neal—Let me say this in addition. Most of our electric light business is new business for the gas company. The arcs on the streets did not displace any gas lamps; they were in the nature of additional lights. We have a good deal of business in the way of electrical lighting in places where gas could not be used—for instance, on the railroads. The Fitchburg railroad people are talking of putting in a quite a number of arc lights over their tracks and in their yard—where we could not have put in our gas lights; the latter would not have been serviceable. When we bought the local electric light company, we also bought out their structures and wires; and we, therefore, have the entire business in our control. If we had not done so, they would possibly have by this taken many of our consumers away from us.

The President—Before this discussion is closed I desire to say a few words in connection with the subject. I trust the members of the gas fraternity will not forget the object they had in view when they entered the business of making and selling illuminating gas, at least not until they have carried the business to that state of perfection where there is nothing more to be learned with respect to either manufacturing or distribution. I have not yet made up my mind to go into the electric light business, because, in the first place, I have very little time to devote to it; and, in the second place, I know very little as yet about the business in which I have spent so many years. I find, year by year, that I have still a great deal to learn; and I would like to attain very much nearer perfection in the business of making and selling gas than I have yet attained before I branch out into anything new. There may be gentlemen who have plenty of leisure, who can prudently go into the electric lighting business. I have no objection to their doing so; but I apprehend that, as an Association, we had better not let ourselves be carried away absolutely and overshadowed by the shadows that are thrown by the electric light. I think we can bring gas to such a state of perfection that it will make the shadow go in the opposite direction—in comparison. I do not agree with my friend Neal that it is necessary to have the electric light for street lighting. I know there is quite a hue and cry for it around the country, and that it has been largely introduced; and he further suggests, with regard to certain places where gas could not be introduced that, therefore, the electric must be. I think perhaps he is in error on that point. Gentlemen who have visited the city of Philadelphia know that large places there are, by the use of the Siemens burner, lighted by gas, that were formerly lighted by the arc electric light; that within a year the change has been made in various squares in Philadelphia, greatly to the satisfaction of the people who have passed by, to the satisfaction of those living in the neighborhood, and to the public generally. I have carefully inquired as to the feeling of the people of Philadelphia about the subject since the meeting of October, in Philadelphia, where our attention was called to it; and I am satisfied, by the use of proper burners, the result desired can be attained, and perhaps at a lessened cost than by the use of the electric light. It has been claimed, and still is claimed, that the electric light is essential in some kinds of business—as for the purpose of bringing out shades and colors; but it has been clearly and well stated by Mr. Prichard that the gas light furnished by the Lungren lamp accomplished that object in a marked degree, and in many cases even better than by the electric light. It appears to me that an argument in favor of the electric light based upon this claim can be done away with almost entirely by the use of such burners as the Lungren lamp; and thus we may be able to retain our business instead of allowing it to be taken from us by the introduction of the electric light. I think the question of comparative cost will largely enter into the continued use of either means of artificial lighting. I believe if the gas men who are engaged in the gas business will devote as much of their energy in the next five years as they have in the past five years to the question of the proper manufacture and consumption of gas, they will find their business not running down at all, but continuing to increase—the general report is that it is increasing throughout the country—and that they will not find any very serious competition from the electric light. I grant there are conditions and places under which and where it may still be called for, and will be called for; but that the electric light business is going to be the bear to eat up the gas companies I do not believe; and if it does, it will be our own fault. I do not wish to be understood as opposing the introduction of electric light by a gas company, if an individual gas company thinks it best to unite that business with that of supplying gas; but what I want to impress on the members is the idea that we must not lose sight of the gas business, and what can be accomplished in furnishing gas for illumination, and devote our attention to the introduction of the electric light. We can much better afford to put a small investment, as was suggested by Mr. Richardson, into the purchase of the Lungren lamp, or something that may surpass it, than to put fifteen or twenty times as much money into an electric light plant, which will tend largely to cut down our gas business through our own failure or neglect to push the gas business as it should be pushed. (Applause.)

Mr. Neal—I hope the Association will pardon me for speaking again; but I have been asked if our business has increased. I answer that it has increased very much during the last year—at least ten per cent. The President says that the electric light is not necessary. Well, it may not be necessary; but the practical question for us to consider is, does the public demand it? If it does, it must have it. I want to thank the President for the good advice he has given me, not to neglect the gas business. I am not doing that. I am giving my attention to it, and I hope in time to have regenerative furnaces, and to increase the capacity of my benches. To show that I am very progressive I may state, which perhaps some of you already know, that I have a very pretty auxiliary water-gas plant; that it is doing very well; and that I am not sorry I put it in, although the price of naphtha seems to be rising steadily to six cents per gallon. The business of gas lighting in Charlestown seems to be increasing very rapidly, and I am devoting my energies to the improvement of all the machinery for the purpose of meeting that increase. I want to say that during this discussion, while listening to the remarks of my brother from North Adams with regard to the Lungren lamp, I have been thinking where I could put those lamps to the best advantage; and I propose to place them just the same as I would do if I had had nothing to do with the electric light.

The President—Is there anything further to be said on this question. If not, we will consider that the question has been fully answered.

Mr. Stiness—I do not want to be misunderstood with regard to my statement about being taken in by the bears. My statement is that unless the gas companies advance, by entirely abandoning the policy of "We get along well enough now" (those days have passed), and take up this question of improved burners, and press it upon the community in the same manner and with the same force that the electric light companies press their business, the gas companies will get inside the bear.

The President—I wish to emphasize Mr. Stiness' suggestion; and I am very glad that he made it. I think if the gas managers devote as much energy to the introduction of improved burners, and improved furnaces, and to the pushing of their business generally on business principles, as the electric light companies have been and are doing, that the success of gas companies has hardly commenced. Just look at what has been done in the last five years. Now, if you will go on in the next five years and surpass what has been done in the past, the result will astonish every man here. There is no question about it.

Before a motion to adjourn (the regular business of the meeting having terminated) is offered I desire to present further proof of what has been said with regard to the probability of our continuing in the business of making and selling gas, with the object of furnishing it as a means of illumination and of use for domestic purposes. If we need any encouragement in the hope that we are not to be turned out of doors, a gentleman is present with us who can give us words of encouragement. I know that our members are always delighted to hear him, for they always receive some valuable suggestions from his counselling. His words of encouragement will send us on our way, until we have the pleasure of meeting again, with feelings of rejoicing. I refer to our esteemed friend, Mr. G. Shepard Page, of New York, and ask him to say a few words. [In response to the invitation, Mr. Page made the following remarks:]

Remarks of Mr. Page.

Mr. Page—It certainly is needless for me to say that it is a pleasure to meet with you, for an invitation to attend your gatherings is always one of the pleasantest experiences of my business life. Although not privileged to have been with you yesterday, but be-

lieving that the interesting proceedings of to-day are a duplication of yesterday's, I am sure that the anticipations of good results that are to come from this meeting will be realized.

I do not think that the gas industry is in its declining years. An industry that has gloriously survived so many fierce attacks that emanated from so many quarters; an industry that has had its life extinguished, and been reported buried (by its enemies and the press) so many times, but which to-day is sending out more light throughout the world than any other agency, and that light increasing at the rate of 15 or 20 per cent. per annum, thus doubling in every five years, with its cost becoming less and less every year, I submit there can be nothing to fear with regard to its permanence.

While it is a moot question, and one worthy of discussion, as to what additional agencies or helps shall be drawn to the industry from other sources of lighting, yet certainly nothing can be added to it that will be cheaper; and only the special features—the special advantages of any locality—would cause a gas manager to say "yes" or "no" to propositions for enlarging his mode of lighting.

Perhaps you will permit me, and possibly expect me, to add a word or two with regard to that of which I know more than of any other subject, and that is the outlook for the residuals of gas making. The depression still continues. The prices of coal-tar products did not advance 1 per cent. in Europe during the past year; and they were only advanced in this country by the combination among the tar distillers. I have been very glad to notice that in some sections, and with some companies, the price paid for coal tar has been satisfactory. With the old contracts running at the low prices, it could hardly be expected that the contractors would come forward and offer an advance before such contracts expired. The outlook in the United States is now quite encouraging. I believe that the time is near at hand when every paving stone used in our cities will be laid with a foundation of coal tar and asphalt, and the spaces between filled in with coal tar pitch. That demand alone will cause the price of coal tar pitch to advance materially. In that event it will require a large percentage of the production of the country for this use alone. It is the best pavement for cities that can possibly be constructed. One of the most striking things that I saw in visiting the old country, in 1870, was the way in which the street pavements of the city of Manchester were being made. For some four or five years the authorities had been taking up the old pavements and relaying them in that way. It was the best paved city that I visited between Queenstown, in Ireland, and St. Petersburgh, in Russia. The use of it on the other side has steadily grown; but, singularly enough, its use here is growing more rapidly than in Europe. In Boston it has been used to some extent; but in the cities of the Middle and Western States this system is being widely adopted. The new granite pavement on Fifth avenue, New York, is being laid with the use of pitch.

It has been found, after the most careful experiments by engineers in New York, who have had in hand the mode in which wires shall be laid under ground, that the concrete pipe made by the use of coal tar pitch, instead of natural asphalt, is one of the best protections that can be employed.

As you know, the Legislature has required all wires in New York City to be placed under ground; and that must soon be done in all our cities, for it is found to be a cheaper and better way than the present mode of stringing wires. I am sure that the substance principally required for that purpose will be coal tar pitch, which forms 75 per cent. of the bulk of the tar. This increasing use will certainly raise its value, and its enhanced value will naturally cause a better price to be paid for the tar.

During the past year, for the first time in the history of coal tar distilling, a very large percentage of the creosote oil was used for wood preservation. Creosoting works have been built in several new sections by railroad companies and by private parties. This will give a greater value to the creosote oil than has been realized for several years.

Benzole is still at the low ebb at which it has been for two or three years, caused by the enormous production all over the world competing for the demand for color making, and the failure of the manufacture and demand in color making and color using to keep pace with the increase in the production of benzole. Therefore, instead of selling at seven shillings per gallon (the first time I made a gallon of refined benzole, in Chelsea, in 1860, it sold at ten shillings or $2.50 per gallon), it is now selling at 37 1-2 cents per gallon. The naphthas are being used to a greater extent; but the value has not yet much advanced. Anthracine has fallen to so low a figure (twenty cents per unit per hundred weight) that it does not pay the American tar distiller to make it. I have sold many thousand pounds at $1.50 per unit per hundred weight. Naphthaline, however, is becoming a more important product; and from that source the tar distiller will eventually derive a large income. Not only by its use in the Albo-Carbon burner, but also in the mechanic arts in various ways it is becoming an article of marked interest. Its latest use is in an explosive, and the power of the explosive is many times greater than that of nitroglycerine. It is obtained, commercially, solely from coal tar. I think it must be admitted that the outlook for coal tar is promising.

Turning now to the other residual—ammonia—I can say that the use of aqua ammonia and anhydrous ammonia, for refrigerating, is growing very rapidly. In the South alone there were erected last year not less than 60 or 70 different plants for making ice; and last year there were put into breweries, cold storage warehouses, packing houses, and hotels in the North, not less than 50 machines, rating from 5 to 100 tons of ice-making capacity per day. These machines, with hardly an exception, use ammonia as the chemical agent. The day is not far distant when in New York City every pound of ice, and all the cold that is now produced by the use of ice, will be produced artificially. The production of ice has reduced its cost even in the South to a price not exceeding $1.25 per ton. The other uses for ammonia are increasing—particularly its use for domestic purposes. I am told that in Boston the manufacturer sends out a great tank on wheels, delivering five or ten gallons to a house, as oil is delivered. Even in Chelsea, in Charlestown and in Cambridge, the delivery is made in that way. It is being sold more largely by the druggists; but even dry goods and grocery firms are selling household ammonia put up in bottles. It is, of course, of very weak strength, of 12, 14 and 16 degrees, but of very great domestic value. In clothes washing it saves the hard labor of the washer-woman by softening the water immediately. If you use a few drops of it in the basin when washing, you feel its effects upon the skin at once. A table-spoonful in a bath tub is royal. Its tonic effect when you enter the water is very exhilarating. Anyone who has not tried it will do well to test it, and after you have once used it you will never let your ammonia bottle run dry.

Mr. Neal—Can you dispense with soap entirely?

Mr. Page—No; but ammonia saves soap. Large quantities of ammoniacal liquor are required for the aqua ammonia used for wool scouring, and in the manufacture of muriate of ammonia, nitrate of ammonia and carbonate of ammonia. In the form of nitrate of ammonia it is used quite largely in connection with nitroglycerine, as an explosive, and is found to be of great advantage. The stone is more finely comminuted by the explosion than by nitroglycerine, and its power is greater. It is quicker, and it is also somewhat safer in transportation.

I wish I might say that the sulphur which is contained in the oxide of iron that you are throwing away now was of immediate value. Probably twenty or thirty thousand tons of brimstone are contained in the spent oxide already discarded as worthless in this country. You never throw it out until it contain 50 or 60 per cent. of identically the same sulphur that is brought from Italy. It is nearly all utilized abroad, a small price being paid for it. It is burned in peculiarly constructed furnaces, and sulphuric acid is made from it precisely as from sulphur. I think a way will be found to utilize it here.

Five years ago, accompanied by two English friends who were interested in the manufacture of sulphuric acid and sulphate of ammonia abroad, we visited and sampled three heaps in New York City, and my friends found, from an analysis of a quantity of spent oxide in those piles, that they contained from 50 to 70 per cent. —no less than 800 tons of sulphur.

I did not intend to occupy so much of your time. Indeed, I did not anticipate saying a word at this convention; but if I have added anything of interest or of value, I am doubly repaid by the compliment of your invitation and the opportunity to present these hopeful and encouraging facts.

On motion of Mr. Cabot, a vote of thanks was tendered to Mr. Page for his remarks.

VOTES OF THANKS.

Mr. Greenough—Before we adjourn I wish to call the attention of the Association to the readiness, the courtesy and the promptness with which the presiding officer has directed these meetings; and I

move that a vote of thanks be given to President Harbison for what he has done. (Seconded by Mr. Cabot.)

The motion was put by the Secretary, and unanimously adopted by a rising vote.

The President—Gentlemen of the Association: I cannot help feeling very grateful for this expression of your satisfaction at the way in which this meeting of the Association has been presided over. I certainly am sincere and honest when I say that I entered upon the performance of the duties of the office with very serious misgivings. My connection with this Association dates back to very near its organization; and I have observed and remembered the manner in which the affairs of the Association have been conducted by the gentlemen who have preceded me in the office which I now hold, commencing with Greenough, Senior, and coming down to my immediate predecessor, Greenough, Junior. The history of the Association has been marked by the very able manner in which its deliberations have been presided over; and so I say that I entered upon the performance of the duties of the position to which you so kindly called me, feeling that it would not be within my power to keep up the reputation which this Association had attained up to that time. If I have been able in any reasonable degree to meet your expectations I shall feel more than gratified. It has been exceedingly pleasing to me, during the past few hours, to hear various members of the Association speak so pleasantly in regard to what they considered the success of the meeting which is now drawing to a close. That success has been largely due to the younger members of the Association who responded so promptly to the request of the Secretary for ammunition—or papers—to be read and discussed in the Association; to the care and thoroughness with which these papers have been prepared; and largely to the members of the Association who have taken part in the discussions, and made the meeting a continued success, and of great practical value to every one of us. For the year to come I desire to ask your hearty co-operation, the active co-operation particularly of the young men, that they may, without waiting to be asked, prepare material for discussion at the next annual meeting, and for that purpose begin soon to collect data with reference to bringing it to our attention. I desire to return thanks again for your hearty vote of thanks, and to say that I fully appreciate your kindness.

Mr. Sherman—I move that the thanks of this Association be tendered to our Secretary for the very acceptable manner in which he has filled his position during the past year. It is no exaggeration to say that the success or failure of these meetings depends more upon the Secretary than upon any other officer we have; and only those who have filled the office are aware of the great amount of labor connected with the office.

The President—It gives me great pleasure to bear testimony to the faithfulness with which the Secretary has discharged his duties. I made no allusion, when I was speaking, to the duties of the Secretary, because I knew the members of the Association appreciated the labor he has performed; that before the motion to adjourn was made, a motion of thanks to him would be offered, and that then would be the time for me to say what I had to say in connection with it. It is a laborious office. It is an office that, unless well filled, the meetings would fail to be worth coming to. There is a great deal of labor connected with the proper performance of the duties of the office, and that that labor has been well done I am glad to be able to bear testimony, without any mental reservation. I feel sure that you all heartily appreciate what our worthy Secretary has done.

The motion of Mr. Sherman was unanimously adopted by a rising vote.

The Secretary—Mr. President and gentlemen: I am very grateful for this vote of thanks. I certainly have tried hard to make the meeting a success, but, as I said to you last year, without the assistance of the members that would have been impossible. To the members who have kindly prepared papers, and who have seconded my efforts, I am under very great obligations. I trust that the meetings will grow in interest year by year. I think that among our members we have many of very great ability; hence with that ability our meetings should equal in interest those of any of the Associations of this country, and with your help there is no doubt that they can be made so.

The President thereupon declared the Convention adjourned.

REPORTS OF COMMTTEE ON MEMORIALS.

The Committee appointed to prepare minutes upon the death of

MR. WILLIAM C. TABER,

of New Bedford, Mass., respectfully report:

Mr. Taber became a member of this Association in the year 1871. Those who knew him remember his genial, kindly greeting, and his fund of dry, delicious humor, which came spontaneously from the quiet unostentatiousness of the man.

Mr. Taber became the President of the New Bedford Gas Company, and undertook its management in 1854, and continued in that office until 1885, when he resigned, although retaining his position as Director until his death, in March, 1886, in the ninetieth year of his age.

During this service of thirty-one years he became acquainted with many of the gas fraternity, in New England and elsewhere, although he was seldom present at our meetings.

His patient bearing in the oft-times difficult position of a Gas Manager won for him a kind remembrance from those with whom he was brought in contact in his business.

His professional brethren need not be reminded of his readiness to be one in any combination of interests which might aid or abet the public good, either by prudent counsel or prompt action.

Although, from the infirmities of age, in the past few years he was unable to meet many of the members of the Association, yet those whom he did meet never lacked any expression of sympathy, or heartiness of reception.

Truly loved by all, he lived to see the work in his hands grow from year to year, until, at the age of ninety, he passed away.

Having been also deputed to prepare a memorial record of our deceased member,

DR. ESTES HOWE,

late Treasurer of the Cambridge (Mass.) Gas Light Company, we respectfully submit the following:

Dr. Estes Howe was born in 1815, and graduated at Harvard University in the class of 1832.

He ceased practicing in his profession in the year 1852, when he was elected Treasurer of the Cambridge Gas Light Company. In 1859 and 1871 he served in the Senate, and was, for a time, associated with the Water Board. He was also, for several years, the Treasurer of the Hoosac Tunnel and Western Railroad.

Of our friend it may truly be said that he brought to these varied trusts a high sense of honor, a spotless integrity, and a conscientious sense of the responsibilities and duties of the position confided to his care.

Respectfully submitted,

S. G. STINESS,
GEO. D. CABOT, } Committee.
H. A. ALLYN,

The Committee appointed to prepare a minute upon the death of

MR. W. J. MILLER,

of Bristol, R. I., respectfully report:

Mr. Miller became a member of this Association in the year 1871, and continued an active member until his death, although for the past few years, owing to failing health and press of business, he had not been able to be present at our meetings.

He was one of the original stock-holders of the Bristol Gas Company, and at the first meeting, in June, 1855, was elected Director, Superintendent, Secretary and Treasurer, which positions he held continuously, till the date of his death, in February, 1886.

He was also one of the original stock-holders of ths Willimantic Gas Company, organized in 1859, and held the position of Manager in that Company until his death.

He was of a kind and genial disposition, retiring in his manner and faithful to every trust reposed in him. Honored by the citizens of his town, beloved and respected by all who knew him, when he passed to the "Land of the Living" he left behind an honored name.

Respectfully submitted,

S. G. STINESS,
W. A. STEDMAN, } Committee.

Mr. T. Fletcher's Lecture on "Curious Gas Flames."

In our last issue our English correspondent, Mr. Norton H. Humphreys, alluded to a lecture on "Curious Flames," delivered at a meeting of the Manchester Technical School, by Mr. T. Fletcher, F. C. S., of Warrington, England. It had been our intention to reproduce the lecturer's remarks in an earlier issue, but press of matter prevented us from so doing. Now, however, we take occasion to place the lecture before our readers, and premise the reproduction by giving the London *Journal* credit for our report of same. Mr. Fletcher, who was greeted by a large audience, spoke as follows:—

Flames and their peculiarities have not, up to the present time, received the amount of study which is necessary to understand them from a scientific point of view, or to utilize them commercially to the best advantage. Flame is really nothing but a sign of an incomplete or transition state of chemical combination. Its presence during combustion is not always necessary; and I think I am within the actual facts when I say that its presence under practical conditions in commercial use always indicates a loss of work. Many of the experiments I shall show you have been adopted as regular demonstrations at scientific lectures; and the details of these will be found scattered amongst different lectures of my own, but they have never been collected and classified so as to be utilized for a systematic study of the laws of flame and combustion, and enable a broad and general view to be obtained on this most important subject. The appearance of flame is misleading; and, as I will show you, the greater the flame, the smaller the work done, other things being equal. I have recently been asked by a well-known engineer if I could explain why certain boilers gave such an exceedingly small duty for the fuel consumed when the flues were, as he said, "filled from end to end with magnificent flame." The fact was his so-called magnificent flame was a delusion, hollow and cold inside, and not coming in contact with his boiler at all. When the fuel was burnt with a very small flame, hardly visible over the bridge, the duty increased some 30 per cent. I will now give you some practical demonstrations of the various characters of flames and their delusive appearances. A cotton handkerchief, as you, no doubt, are aware, will burn readily to ashes; and this I will prove to you by burning one. I have here another, precisely the same, which I will saturate with proof spirit; and, as you see, the flame, although apparently a fierce one, is not hot enough to ignite the handkerchief, which comes out of the fiery test without a singe or mark. The fact is that the flame is not only comparatively a cold one, but it is also hollow, and does not come in contact with the handkerchief at all; the space between the handkerchief and the flame being filled with cold vapor, which only burns when it comes into contact with the surrounding air. To make this internal space in a flame visible to you, I must experiment in a different way. I now take a burner 8 inches in diameter, supplied with a mixture of coal-gas and air; the air being supplied in quantity sufficient to increase the bulk of the flame, but not enough to enable the gas to burn except on the outer surface, where the mixture comes into contact with the surrounding air, with which it combines. This great flame is formed by the combustion of coal-gas at the rate of 2 cubic feet and about 20 cubic feet of air per minute. It is of very little use for any purpose; and I will now proceed to prove how great a delusion it is by placing a ball of paper inside it, then some loose gunpowder on an open paper, and again a ball of gun cotton, all of which remain untouched. The outer film of flame is hot enough to burn my hand if left in it; but if the body of my hand is protected with a damp cloth, I can, as you see, put my naked fingers inside the flame without discomfort, and pick the paper of gun cotton out of the centre of the flame. By an alteration of the burner, admitting sufficient air with the gas to form an explosive mixture, which will burn without assistance from the external air, the flame instantly becomes solid, much smaller, less visible, and at once explodes the gunpowder. If not the first to discover the peculiarities and value of a solid flame without a cold centre, the first application of this discovery to practical use was in Manchester by Mr. Wallace; and any mention of this valuable improvement would be incomplete without a reference to the name of so worthy a pioneer in the study of combustion. To reduce the flame to a still smaller size, a different form of burner is necessary, with a supply of air under pressure; and you now see the same quantity of gas and air burning, but the space taken up by the combustion, instead of being as at first 8 inches wide and 18 inches high, is less than 100th part the size; and instead of being able to put my bare hand in it, it will fuse wrought iron almost instantly. It is well known that the available duty of any source of heat is, other things being equal, in direct proportion to the difference of temperature between this source and the object to be heated; and, therefore, we shall get a much larger amount of work from our small high temperature flame than from the large and colder one. I will now dispense with flame altogether, and show you the same quantity of gas and air burning as before, but in the most perfect form; the combination taking place on the surface of the substance to be heated without any flame. To show this so that all can see, the mixture of gas and air is directed on a large ball of iron wire; flame being used at first to heat the wire to the necessary temperature to continue the combustion. By stopping the gas supply for an instant, the flame is extinguished; and the combustion is now continued without any flame, but with an enormous increase in the heat obtained. This invisible or flameless combustion is only possible under certain conditions; and one essential point is that the combustible mixture shall come into absolute contact with a substance at a high temperature which is capable of absorbing the heat as it is generated. I will now heat this small furnace to a temperature sufficient to cause combustion without flame, and will then remove the side, showing you the interior of the furnace with a crucible being kept at a white heat by blowing a cold mixture of gas and air into it. In the absence of a solid substance at a high temperature, it is impossible to cause combustion without flame; and when a flame is used, it is also impossible to make it touch a cold surface. Many of you will imagine that if a solid body is surrounded by a flame, the flame touches it. This is altogether a mistake; there is a space between the two which it is impossible to pass—a cold and flameless zone which surrounds the cold surface, and which is quite impassable to flame under any conditions, and which most seriously obstructs the work of heating. To enable you to see that this impassable cold zone exists beyond any doubt, I have here a copper vessel containing water, and on the side of this vessel I have pasted a thin paper label. On this I will direct the powerful flame which you have seen will fuse wrought iron instantly, and the paper remains untouched, without a trace of singeing. The full force of the flame, urged by a heavy blast of air, may be directed on this paper for any length of time without the slightest effect, so long as the vessel contains any water. You will no doubt imagine that the heat is absorbed so quickly that the paper has not time to get hot; but it is very easy to prove that this is not the case by heating a wire in the same flame and touching the paper with it, causing instant charring. The cause of this extraordinary result has never yet been fully explained; but I believe it to be that all substances have an adherent film of air which resists the passage of any flame, but which is, of course, instantly removed by the application of any solid substance. This theory has one weak point, that the cold zone is impassable also to radiant heat; and in the face of this fact, I must say that a really satisfactory explanation is yet to be found which will agree with the present accepted theories of heat. The action of flame or heated matter on moist surfaces is much more easily explained. It is known that a moist hand or stick can be passed through molten iron without burning owing to the film of steam evolved, which prevents contact with the metal. The same reason accounts for the fact that I can burn gun cotton on my hand without feeling any heat, the moisture present absorbing the heat as fast as it is evolved. In the case of the paper label on the metal vessel, there is no moisture; the label having been carefully dried, to prevent the sudden formation of steam lifting it away from the metal surface. I think that the peculiar resistance to flame contact with a cold surface requires some further explanation than the present theories can account for. In connection with the subject of flames, I may refer, as a curiosity, to the enormous volume of sound of different tones which is produced by placing various sizes of chimneys on a gauze burner consuming a mixture of gas and air; the sound is as powerful, but certainly not so pleasing, as that of a fog-horn. In all my experiments ordinary air has been used to combine with the combustible materials—air being composed of four parts of nitrogen and one of oxygen. The nitrogen is quite inert, having no power to combine; in fact, it does nothing except dilute the oxygen, and reduce the temperature obtained. If we remove the nitrogen and use oxygen alone, the combustion is far more rapid and intense. So powerful is oxygen alone, that substances which are supposed to be incombustible—such as iron wire—burn readily in it. I have here a glass vessel full of oxygen, which is ordinary air with the useless nitrogen removed from it; and, as a final experiment, I will show you that iron, which is not usually considered a fuel, burns brilliantly in oxygen gas. In the combustion of iron, magnesium, and other substances of which the product is a solid, and not a vapor or gas, flame proper never exists; although in the combustion of magnesium and zinc it is apparently present. The brilliant incandescence of the particles thrown off causes a deceptive appearance. Flame never exists except as the result of the combination of two or more gases or vapors. As a familiar instance of both forms of combustion, there is no more striking example than coke or charcoal, which, if burnt at once to carbonic acid, burn entirely without flame. If the supply of air is deficient, carbonic oxide is formed, which, being a combustible gas, burns with a flame. When speaking of the properties of flame, I am on the borders of the unknown; and my experiments and knowledge of this subject are very incomplete. The study is to myself one of both business and pleasure combined; and I am still studying experimentally the cold zone or space which exists between all flames and cold substances to which they are applied. If this cold zone can be passed in practice, and the flames can be applied in direct contact with the vessels to be heated, we shall then obtain something approaching the full theoretical duty of the fuel consumed, and our waste of fuel will drop to a very small fraction. In a paper which I had the honor of reading before the Iron and Steel Institute, I referred to one problem in heating which, if solved, would reduce our waste of fuel to zero—*i. e.*, the conversion of a large bulk of heat of low intensity, to a smaller bulk of heat of high intensity. This conversion is possible with all other natural forces, such as light, electricity, etc.; and I believe it to be possible with heat also—the only objection being, so far as I can see, that we do not know how to do it at present. But I have no doubt that the time will come when this problem will be solved by some one, who will be rewarded by both fame and fortune.

The Velsbach Incandescent Gas Burner.

The JOURNAL, published on May 17, 1886, p. 290, contains an illustration and description of the incandescent gas burner that resulted from the studies of Dr. Auer (patented by him, in France, during November, 1885) von Velsbach, but which at the time did not seem likely to develop the somewhat extravagant claims of those interested in its ownership. From the best advice obtainable we fail to learn that the Auer plan of incandescent gas lighting has made much progress, in either France or Germany, during the twelvemonth; but we now have news that English capitalists have interested themselves in the Auer principle and apparatus. The following (which explains itself), from *Engineering*, will show the present standing of the Auer von Velsbach plan for obtaining improved illumination under the inventor's methods. It will be well to bear in mind that *Engineering's* mention of the "tested on a large scale in Vienna" instance should be taken with a liberal allowance of doubt, for the Vienna exhibition was of a decidedly limited nature. The paper noted, says:

The production of light for illuminating purposes by the incandescence of a refractory material has been the cherished object of many inventors, some of whom have so far developed their ideas as to have brought them more or less successfully from the laboratory into the market. The Clamond, Popp, Lewis, and more recently the Lowe and the Auer von Velsbach systems, are those of which we have heard the most, and which have found a more or less extended practical application. This last-named has been for a considerable time tested on a large scale in Vienna, and is now being somewhat tardily brought to the notice of the public in this country. Before Auer von Velsbach, a Viennese scientist, discovered a way to utilize one of the most refractory of known materials—zirconia—highly resistant earths and metals had been employed. Thus the Clamond system comprises the use of magnesia either in filaments, slabs, or pencils, against which the intense heat produced by a modified Bunsen burner is projected. Popp, Lewis, and Lowe, on the other hand, employ a cage of platinum, but in each of the two typical systems gas and air have to be supplied to the burner at exceptional pressures, involving special arrangements which complicate the process, and limit the range of their applications. With water gas such special arrangements are unnecessary, and we believe that at many factories in Germany, where water gas is made use of, the Clamond system is found to give satisfactory results. The pencils of magnesia, however, require very frequent renewal, and although the cost thus incurred is insignificant, the comparatively short duration of the incandescent material presents a very grave difficulty. In those systems, also, where cages of platinum wire are employed, the same objection applies with greater force, for not only does the platinum soften and absorb carbon under the continued action of intense heat, but the color of the light is not good, and the cost of renewal is relatively heavy.

The system of Professor Auer is one of extreme beauty and ingenuity. He extracts, by a complicated chemical process, the metal zirconia from one or other of the several zircon ores found in nature, and combines it in solution with solutions of lanthanum, and of one or more other rare and refractory metals, to obtain the basis on which his incandescent light depends. With the fluid thus produced he impregnates a hood of finely woven fabric, which, when dry, is suspended over a Bunsen burner and ignited; the combustible fabric is burnt away, the water of the solution evaporated, and there remains a delicate, an extremely delicate, zirconian counterpart of the original fabric, shrunk, of course, but perfect in every mesh. Prior to impregnation the top of the hood is secured by a fine platinum wire, which subsequently serves as a means of support, it being attached to a stem placed in the fittings of the lamp. The burner employed is of the Bunsen type, modified by an old and well-known device, so that it can be turned down without "lighting back," and the heat thus obtained, without any augmentation of pressure, is sufficient to bring the zirconia skeleton to a state of brilliant white incandescence, the luminous energy of the gas consumed in this way being considerably higher than when burnt in the most economical gas burner. As much as seven or eight candles per foot of gas burnt per hour can be obtained, though probably this is considerably higher than the average that would be given. There being no flame, the light is absolutely steady.

An installation of Velsbach burners has been erected at the Marlborough Gallery of Paintings, 53 Pall Mall, S. W., and awakens the admiration of all who see it, both for the absolute steadiness of the light, and for the beautiful quality of the illumination, which has a tone intermediate between that of an electric incandescence and an arc lamp. All the shades of green and blue in the paintings hung on the walls of the gallery come out with perfect accuracy, and it only needs the substitution of another source of light to render evident the great difference between gas burned under the Velsbach system and any other in vogue in this country. Fifty-six burners are arranged in two rows along the center of the room, and provide an illumination which is perfectly steady and noiseless, free from all dirt and smoke, and far less heating than usual, since little more than only one-third the ordinary quantity of gas per unit of light is consumed.

The burners at the Marlborough Gallery are, we believe, of the Austrian manufacture, but their production in this country is being attempted. Those we are describing are formed of a Bunsen burner having a gas jet on the principle of the watering rose—that is, with a number of small holes through which the gas is emitted in fine streams, which mingle with the air entering the mixing tube at the sides in the usual manner. This arrangement gives a short flame of great heat, and one which is quite free from all sound. The gas burns at the outlet of the mixing tube, within a hood or mantle formed of zirconia, as already described. This hood is made originally from hosiery fabric in the form of a tube, and is supported by a ring of platinum wire at its upper end. The tube is first doubled on itself, and then the wire is sewn into it, thus securing the hem and forming a means of attachment. By the aid of two extensions the wire ring thus formed is secured to a support, and the hood is held over the flame. According to another method of manufacture, devised by Mr. A. Paget, of Loughborough, the hoods are each made separately on a hosiery frame, and are provided with a channel, such as ladies call a string-case, at the upper edge. The platinum wire is threaded through this channel, and is provided with a cross hoop, like a bucket handle, by which the hood can be suspended from a hook. This arrangement gives a neat appearance to the hood, and causes the shrinkage to take place in a more symmetrical manner, avoiding plaits which may ultimately become sources of weakness owing to unequal temperature.

As the hood, after its incineration, is extremely fragile, it is necessary that it shall be protected as far as possible from the dangers of transport and handling. For this purpose the attachment from which it is suspended is fixed to a gallery, which forms the base of the chimney, and the three constitute a compact piece which can be moved safely. The hood cannot be unintentionally removed from the inside of the chimney, and the presence of the glass insures that reasonable care will be exercised in handling, even by ignorant servants. In connection with the gallery, which slides over the mixing tube of the burner, there is a grid which fits on the tube and prevents the flame striking back when the gas supply is reduced.

Experiments made on Monday last (Jan. 31) showed that with a consumption of 2.4 cubic feet of gas, at a pressure of 0.9 in. to 1 in. of water, an illumination of 18 standard candles was obtained, or an efficiency of 7.5 candles per cubic foot of gas. It is needless to say that this is a most successful result, and that if considerations of economy of consumption were the sole elements in the relation of gas burners, the Velsbach light must supersede all others. The question of the durability of the hood has, however, to be taken into account. Considering the very delicate nature of this part, which must not be subjected to rough usage of any kind, it is probable that in ordinary use comparatively few will perish of old age, but will be destroyed by accident. Laboratory experiments, however, show a duration of 1,000 hours, with but little reduction in the light-giving qualities, and we believe that 2,000 hours have been reached without remarkable deterioration. It is evident that if limits like these could be approached as an average, the cost of renewals would be insignificant, and the trouble involved inappreciable. But it is not likely that in common use, where the delicate film is exposed to careless and ignorant handling, and to all the thousand and one shocks of everyday life and work, that great longevity will be reached, and the items of cost and trouble may then enter as important factors in the equation of real usefulness. On the other hand, there is a large margin in economized gas, 50 per cent. is not too high an estimate, and this saving will balance damaged hoods and tired patience to a large extent, while an absolutely pure and steady light, a reduction in proportion to that of the gas consumed, in vitiated atmospheres, are no small advantages.

We believe that the Auer von Velsbach system has an extended field of usefulness before it, and that it will grow rapidly in favor in places where sufficient gas is burned to render it worth while for some with a capacity beyond that of domestic servants, to take charge of the fittings, and until it is challenged by some robuster and equally efficient rival, which will defy the destructive finger of the British housemaid. The Velsbach system, with an actually, not relatively, strong hood would be practically perfect; it is for those interested in the question to arrive at this desideratum, and unless they can do so they can scarcely hope to hold a monopoly in gas lighting by incandescence, which promises to be, for a time at least, the "light of the future."

Mr. A. F. Upton Discusses Combustion.

At the Philadelphia meeting of the National Electric Light Association, Mr. A. F. Upton, of the Jarvis Engineering Company, Boston, Mass., presented and read a paper which contributed not a little to the interest of the Society's sessions. In referring to the subject of "Combustion," the writer said:

The subject of combustion of fuel is of sufficient importance among the electric light people to merit a few general remarks on the matter, for it is a

subject that is far less understood by steam users than anyone would suppose, considering the cost of the fuel consumed in making the steam in this country, and the following facts should interest all parties using steam power:

1st. That coal is distilled into gas before it can be properly burned.

2d. That to burn this gas, a sufficient supply of hot air must be introduced at a temperature not low enough to cool the gases below their igniting point.

3d. Every time a lot of fresh coal is thrown on the fire a great production of gas occurs, and if it is to burn to a flame it must have a corresponding supply of hot air. After a time, when the mass of fuel has become red-hot, the supply of gas is greatly diminished, and at first the evolution of gas actually checks the draught; but bear in mind that, although no smoke may be visible from the fire, it by no means follows that its combustion is perfect, for if you diminish the supply of hot air, or reduce the air space of your grate bars, you will be merely distilling carbonic oxide gas up the chimney.

4th. In ordinary boiler furnaces there is an insufficient supply of air; fresh coal is put on the grates, and the firing doors are closed; gas is being distilled from this coal. Now, if you do not furnish air above the fire (and it must be hot enough to ignite the gas), how can you expect to get combustion? Whether it is expected or not it does not burn properly, and your boiler furnace is nothing more than as a gas retort in a gas works, if the latter were making crude gas and wasting it up the chimney; in other words, a first class soot and smoke factory.

Therein we claim the principle of the Jarvis furnace to be correct. It does furnish pre-heated air to ignite and consume these gases, and make flame and heat otherwise wasted in the chimney; further, it allows of the use of fuel or a class of fuels that, in an ordinary furnace, will produce little else than soot and smoke.

As most boiler furnaces are constructed they are nothing else but gas producers—that is, all gas producers are extra bad stoves or boiler furnaces. Consider how ordinary gas is made. There is a red hot retort or cylinder, into which you shovel a quantity of coal, which flames and smokes vigorously as long as the door is open; when it is full of coal you shut the door cutting off the supply of air and extinguishing the flame. Gas is now simply distilled, and passes along pipes to be purified and stored. You perceive at once that the difference between a gas retort and an ordinary boiler furnace, with closed doors and half choked grate bars, is not very great.

Consumption of smoke, using bituminous coal: It is not a so-called "smoke-burner" you really want; it is a fuel consumer. You distill your fuel instead of burning it in nine-tenths of your boiler furnaces. There is no such thing as "burning smoke." Once made it cannot be burnt, and the only way I know of burning it is not to make it.

The question of supplying hot air, and the amount to be supplied at the right time, is a question that has puzzled the most scientific men who have made a study of this most important question. The Jarvis furnace is so constructed that the damper regulates the amount of air delivered into the boiler. If the full force of the draught of the chimney is required, then the open damper allows a full supply; a half damper gives one-half the supply; and if the damper is closed no air enters the furnace over the fire. Every first-class steam plant should use a steam damper, and with such a damper the feed of hot air is perfectly automatic. The Jarvis furnace for setting steam boilers is constructed in the following manner.

It is on the same principle as the Siemens-Martin furnace for making steel. In a different manner, and on a smaller scale, we pre-heat air (oxygen), and discharge it over and back of the fires, thus utilizing and igniting gases generally wasted. The joining of hot air with gases creates a draught, and allows the combustion of low-grade fuels that would otherwise require a draught to burn. Smoke is reduced to a minimum by this process. If the fuel is wet it is an advantage where hot air is used.

The principal thing to my mind in regard to electric lighting is the cost of power. I have always claimed from our experience that the matter of power in this regard was figured, in one sense, on a wrong basis. My idea is, to get at the bottom of all economy in electric lighting, the cost of power should be most carefully looked at. The only thing to be considered is the actual cost per lamp per hour, not evaporation of pounds of coal per hour. It is the actual cost of running an incandescent or arc lamp per hour.

The only money to be made in the future in electric lighting under the coming competition is to be made in saving. Reduce the cost of fuel; use only the cheapest and lowest cost grades. Why use the highest cost coal when slack coal, screenings or pea coal can be purchased at one-half price, and, with proper furnaces, evaporate the same amount of water as the highest grades of coal?

Refused to Fix the Price.—The "gas reformers" of New Jersey introduced a bill during the present session of the Legislature, which sought to make an arbitrary rate ($1.25 per thousand) for gas in certain New Jersey cities. The bill was defeated, on March 9.

Notes from the West.

By Retort.

February 28, 1887.

After tremendous surface indications all is again quiet and serene at Cincinnati; and, as usual, the Gas Company emerges from the conflict with that same old smile. Even the public benefactors claim to be happy! The Gas Company will now enter upon its new 10 years' contract to furnish gas at $1.25 per thousand, with 10 cents discount for prompt payment; making the new rate ($1.15) a very happy compromise, and a price that will make a tremendous increase in the output. The fight has been a very pretty one, and reflects great credit upon the "fine Italian hand" that managed the Gas Company's case. Coming at this time, it insures freedom from competition, for the city is engaged in putting down four million dollars' worth of new pavements; and, as a leading paper asserts, will only allow it to be disturbed for the conduits for natural gas.

Capt. A. H. Mattox, whom those of the fraternity met while attending the Cincinnati Convention of the Western Association in 1883, will remember with so much pleasure, and who has been for twenty years a valuable attache of the Cincinnati Gas Company, has tendered his resignation to Gen. Hickenlooper. Capt. Mattox has taken the position of General District Superintendent for a prominent Life Insurance Company, and will have his headquarters in Cincinnati. The retiring official was presented, on February 25, with a handsome gold watch and chain by the employees of the Cincinnati Gas Company.

A new deal seems to be on the tapis in St. Louis, Mo., as the following will show:

"Another move has been made in the gas matters of the city, in the acceptance of the resignation of Mr. C. H. Nash, as General Manager of the St. Louis Gas Works. Mr. Nash was the water gas representative in St. Louis, and has been a prominent figure in all the deals made by the Philadelphia United Gas Improvement Company. He quietly bought a large lot of St. Louis stock, one block in particular occasioning some feeling and considerable comment, for the United people, before the formation of the Trust agreement, and during the time the St. Louis and water gas bills were pending in the Municipal Assembly. Then he went into the market and bought up nearly a control of the Kansas City Gas Light Company for the United, and when enough to answer his purpose was bought at $750 a share, several times the market value, he went to Kansas City to capture the organization, but failed through not having the stock transferred. Still, he took more prominent position with the United, and when the St. Louis Gas Trust was formed Soc. Newman remained as the President and nominal head of the old St. Louis Company, but Mr. Nash, at the request of the water gas interest in the Trust, was made General Manager of the St. Louis. His resignation, followed by the arrival in the city of Mr. S. T. Bodine, Secretary and Treasurer, and Mr. A. C. Humphreys, Egnineer of the United Gas Improvement Company, is thought to be significant in more ways than one.

"Representing the water gas interests, Mr. Nash's plans as manager of the St. Louis Gas Light Company are supposed to have been sanctioned by the Philadelphia interests, and the rejection of his suggestions which brought about his resignation, is thus made the rejection of the water gas plans. The reason given for Mr. Nash's resignation is that only work of a trifling nature was to be done, and, with his large works at St. Joseph on his hands, he regarded his services as too valuable to be wasted under the present policy. The water gas plans anticipate an entire change in the plant of the St. Louis Gas Light Company, the erection of new coal gas works, with such improvements and parts of machinery of other methods of manufacture as to enable the Company to change its process if desirable and utilize the water gas patents."

Comment on the above is unnecessary.

Sometime in February the City Council of Xenia, Ohio, awarded a contract to the Xenia Gas Company, by which the city was to turn over to the Gas Company the electric light plant owned and operated by the municipality the Gas Company to furnish electric lights in the suburbs, but the city was still to be lighted, in its central part, with gas, at the rate of $26 per year per post. The city now attempts to annul its former action, and has taken legal steps to secure a perpetual injunction against the Gas Company, and restraining the Council from fulfilling its contract. A hotly-contested lawsuit seems to be inevitable, with a final settlement through the courts.

Proving or Testing Meters.

The *Gas Engineer* says that in testing gas meters one great essential is a good 10-foot experimental gasholder, with an accurate scale divided into feet, which are again subdivided into tenths and hundredths. The holder should be provided with counterbalance weights, so that its pressure may be controlled at will from 1-tenth to 20-tenths. In addition it should have a separate large weight detached and suspended by a cord, which is lowered and

raised when desired by a kind of windlass, so as to give the very heavy pressure necessary to prove the soundness of the cases of meters. The holder should also be provided with its counterbalance weights and compensating curve. The first is for the purpose of regulating the pressure, the second is to "compensate" for the difference of pressure arising from the holder when being in the water and out of it.

To understand the importance of the compensating curve, let us suppose a holder of the capacity of 10 feet, that its working range is 3 feet, and its area 3 feet 4 inches square, and that the weight of the sides in the length stated is 10 lbs. Now, as in round numbers iron is about eight times heavier than water, it follows that when the holder is submerged in the tank one-eighth of its weight would be lost, and its weight would, under the circumstances, be but 8¼ lbs., which, indeed, with the weight of the top and the part out of the water added thereto, would be the required weight to balance the holder when in the water. But as the holder rises out of the tank, gradually its weight increases until it reaches its highest position, when by the metal of the sides, which has emerged, a weight of 1¼ lbs. has been added to the holder, or equivalent to a pressure of 2-tenths. Therefore, to compensate for this the most simple contrivance is the curve already mentioned; but as its description would not interest the general reader it is omitted. However, should any of our subscribers desire to know the means of setting out the compensating curve, it will be explained in a future issue.

The holder is provided with two taps of large dimensions, so as to admit the gas freely and quickly; also a small blow-off tap, by which, in the event of the holder being too full, it may be lowered to the desired point by the tap in question. All these taps are placed together, and within easy reach of the operator. The inlet of the holder is, of course, connected to the gas supply. The outlet has a flexible tube at the end of which is a screw for receiving the respective cone pieces, according to the size of the meter being tested.

Another requisite is a bench or slab placed perfectly level. A slate slab of about an inch thick, with a gutter all round its edges, so as to carry off any water, is well adapted for the purpose. At the side of this slab is a tank of water with a bench across it for the purpose of charging wet meters.

In addition there are a number of burners attached to the same tube, placed against the wall, and about six feet from the ground, which are in direct communication with the meter to be examined. Of these there are one or more Argands, with their glasses properly cleaned, in order to ascertain the steadiness of the lights when a dry meter is examined. Here, we may observe, that on account of the construction of the wet meters, little doubt can exist about the steadiness of the lights supplied by it. Whereas, with the dry meter, even supposing everything else to be correct, the "ital" of the tangents might render the lights unsteady, therefore steadiness of lights is one point of consideration with them.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The Proprietors of the Shaner Gas Coal Company.—Some time since we noted that a party of Pennsylvania capitalists had organized the Shaner Gas Coal Company, and from the certificate of incorporation filed in the office of the Recorder at Pittsburgh, Pa., we learn that the capital stock of the Company ($250,000, par value of shares being $50 each) is owned by the following-named gentlemen: C. Donnelly, W. McCandless, C. S. Spear, J. S. Cravens, and W. A. Clemens each hold 500 shares; J. D. McKennan, 1,000 shares; and C. C. Dickey, 1,500 shares.

Destruction of an Electric Light Station.—Shortly before 7 A.M. of March 4 the two-storied frame building located on Condor street, East Boston, Mass., occupied as a dynamo station by the Citizens Electric Light Company, was discovered to be on fire. The building (it was valued at $1,200) was destroyed, and considerable damage was done to the dynamos. East Boston will, in consequence, be deprived of its electric lighting for a time; but the omission will not "fall heavily" upon the citizens, for the gas lamps stand ready to occupy the gap.

The Pawtucket (R. I.) Folks will Try it.—The special committee recently appointed by the Pawtucket Gas Light Company to consider the expediency of placing an electric light plant in the Company's old works at Central Falls, decided, on March 3d, to report in favor of the proposition. The findings will have to be ratified at a meeting of the Board of Directors; but it is likely the latter body will endorse the special committee's presentation of the subject. In fact the plans, specifications, and estimates are all prepared, so that the work may be carried out immediately after the Board's indorsement.

To Burn All Night.—At a recent meeting of Richmond (Va.) City Councils the Committee on Light recommended that the public lamps be lighted at 15 minutes after sunset, and extinguished 15 minutes prior to sunrise on each night of the year. A moon table schedule is at present followed, and it would appear as if Richmond were old enough now to emerge from the easy-going practices of the *ante lucem* period.

To Erect a Holder.—The Standard Gas Light Company, of this city, proposes to erect a gasholder (to have a diameter of about 100 feet) on the south side of 115th street, 100 feet East of Pleasant avenue.

Mr. Attrill Would Rather Not.—The New York *Times*, of March 8, says that Judge Donohue, of the Supreme Court, on March 7, granted an injunction to counsel for Mr. H. Y. Attrill restraining Melville C. Day, and other executors of the estate of Commodore C. K. Garrison, from selling stock of the Equitable Gas Light Company, Baltimore, Md., belonging to Mr. Attrill, and held by them as security for money which they claim to be due from him to the estate. This, of course, is a relic connected with the Garrison-Attrill gas deals in Baltimore, New Orleans, etc., when gas raiding in this country was in its infancy. Of course the future will take care o itself; but many a rich hour's work is in store for the legal fledglings of the present day, when the period for construing some of the present gas pools, consolidations, leases, etc., will have arrived. Perhaps even some of the older lights of the bar may have a seat at the feast.

The New York City Subways.—Those of our readers who are interested in the matter of the compulsory underground placing of electric lighting and other wires, will remember the triumphant entree of the Hon. Roswell P. Flower into membership in the New York City Board of Subway Commissioners; and they will also recollect his grand exit therefrom. The Hon. Commissioner had solved the problem in short order, by granting to some high-fangled company the concession to construct a subway where Dorsett, *et al.*, conduits were to be availed of by all companies and individuals interested in the ownership and operation of wires for the transmission of various electric currents. Having solved the problem, the Commissioner resigned his trust and returned to his banking house, feeling assured that the plows of the subway owners would never rest until the streets (or some of them) of New York had taken on a furrowy appearance. It is true that the plows did assist in furrowing a portion of Sixth avenue, but winter's ruthless grip suspended the bucolic operation. Not only so, but it seems to have laid its icy hand upon the spirit of those who furnished the means wherewith to operate and guide the implements of husbandry. We incline to that view because of Corporation Counsel Lacombe's paternal connection with a bill which proposes to foist upon the city the duty of operating all subway conduits. His measure intimates that the city may purchase those (subways) already constructed, or it may build others; and in case the bill becomes a law it is safe to say "those" already down will be purchased. In fact it is patent that the original owners of the subway privilege do not want to throw good money after bad; not only so, but that it would be prudent, statesmanlike, and romantic to "make an effort" to get the bad money turned into good by means of an alchemic resort to the city's treasury.

The Weber Furnaces.—Mr. Adam Weber is as busy as ever. In a recent letter to us he says that, among other work, he is now erecting new benches, to be fired with his improved system of regenerative furnaces, for the following companies: A new stack of eight benches of sixes for the Buffalo (N. Y.) Mutual; five benches of sixes, Citizens, of Buffalo; four benches of sixes Buffalo Gas Light Company; one bench of sixes at Lynn, Mass.; and one bench of sixes at North Adams, Mass. In the four last-named cases the settings were made in old arches. The Weber system of firing continues to please those who have already tried it. For instance, the Supt. of the Buffalo Citizens Company reports a saving of one-third of the fuel expended under the old firing practice. The Supt. of the gas works at the buildings of the New York Catholic Protectory reports that he is obtaining from 7,500 to 8,000 cubic feet per mouthpiece each 24 hours, from settings of threes, placed in short benches with narrow arch.

Bermuda's Pleasant Breezes.—Mr. Wm. R. Beal, President of the Central Gas Company of this city, is enjoying a well-earned vacation among the tropical surroundings of the Bermuda Islands. He will return to the city some time in April.

Enlarging Its Possessions.—A fortnight ago we noted that the Springfield (Mass.) Gas Light Company was in search of an eligible plot of ground whereon to locate a new gasholder. This has since been accomplished by the purchase of two plots, known respectively as the Shaw and Parsons properties. The latter plot contains a brick dwelling house, which will hereafter be occupied as a residence by Mr. A. D. Merritt, Assistant Supt. to the Company. The Shaw land has been chosen for the holder site. The purchases represent an investment of about $10,000. The new holder is to have a capacity of 300,000 cubic feet, which, with the Bliss and Water street holders, will give the Company storage facilities aggregating 600,000 cubic feet.

Grand Forks (Dak.) Ought to be Satisfied.—A month ago we noted the formation of a new gas company for the town of Grand Forks, Dak. Ter. It was an error, in that we did not state the case in extenso. Grand Forks seems likely to have two gas companies, because on the third inst. work was commenced on the plant of the Grand Forks National Gas Company, likewise on the structures of the Dakota Gas Company. Both parties have contracted for apparatus and mains, and have purchased the necessary land. Each side claims to have plenty of capital; but the Grand Forks proprietors have a contract with the city, which would seem to give them a substantial advantage in the rivalry.

To Leave Nebraska City, Neb.—Mr. J. M. Murphy, who for some time past has occupied the position of Supt. of the Nebraska City Gas Company, resigned that berth towards the close of February, in order to take a responsible place in the service of the Maryland Meter Company, of Baltimore. A rather handsome reminder of the niche he occupied in the esteem of his fellow townsmen was vouchsafed the retiring Superintendent by them on the evening of February 26th. The reminder took the shape of a banquet at the Morton House, which was participated in by the "solid men" of Nebraska City. Perhaps the feeling that prompted the feast is best shown by the following excerpt from the Nebraska City *Press* in its account of the affair: "We believe we are safe in saying that Mr. J. M. Murphy could have asked no more graceful compliment or fuller recognition of the affection and esteem in which he is held by his friends than that accorded him last evening at the Morton House; and it is just as certain that those having the matter in charge could have found no more fit subject to honor with the compliment of a banquet than Mr. J. M. Murphy. It was a delightful affair in all respects." Mr. F. E. McMillin is to assume the office made vacant by Mr. Murphy's resignation.

To Furnish Electric Light.—We are informed that the managers of the Municipal Gas Company, Albany, New York, have determined to operate an incandescent electric lighting plant in conjunction with the gas supply. Our present advices do not intimate the particular system that is to be adopted.

Retorts for the Quaker City Gas Works.—Mr. Jas. Gardner, Jr., whose recent trip to the ever faithful Isle appears to have agreed with him amazingly, writes that he has just secured a contract to furnish 90 benches of fives to the Market street station of the Quaker City gas works.

Financial Standing of the Middletown (Ohio) Gas Company.—From an inventory recently filed with the County Clerk we learn that the Middletown Gas Light Company estimates its property to be worth $35,477; it owes $2,193; and its assets and liabilities balance at $37,781. The authorized capital stock is $60,000.

They Want to See the Books.—A committee of the stockholders of the McKeesport (Pa.) Gas Light Company assert that they are preparing to bring suit against the officers of the Company to compel them to open the books for inspection. The malcontents claim that the profits are absorbed by the high salaries paid the officials.

Street Lighting at Circleville, Ohio.—At a recent meeting of the Circleville City Council bids for street lighting were opened. Three propositions were made. The Gas Company offered to light 137 lamps, guaranteed power of 16 candles, at $18 per post per annum, contract to last, at option of Council for one or five years; the electric light company offered to supply 16-candle power incandescent lights at price bid by the gas company, but wanted a five-year contract. Jones & Underhill of Columbus, offered to light with kerosene at $10 per lamp. The contract was awarded to the gas men. A moon-table is followed at Circleville.

Lowell's Cheap Gas.—The new gas rate at Lowell, Mass., of $1.20 per thousand cubic feet, goes into effect on April 1st.

At Last it is Settled.—Some time back we noted that the net gas rate in Cincinnati, Ohio, was to be $1.25 per thousand cubic feet. It seems, however, after the thing was supposed to have been settled, that a new proposition was substituted; but there can be no doubt about the correctness and finality of the following statement in regard to the net rates to prevail during the next ten years for gas in Cincinnati. The gross price is fixed at $1.25 per thousand, with ten cents off for prompt payment. Not so far from the dollar notch; is it?

Managers of the Albany (N. Y.) Edison Company.—At the election (March 4) of managers for the Edison Electric Illuminating Company, of Albany, Henry R. Pierson was chosen President; James M. Warner Vice-President; Edgar Cottrell, Secretary; J. W. Eaton, Jr., Treasurer; James MacNaughton, Supt. and Manager.

In Charge of the Fulton-Municipal Works.—Mr. J. H. Jourdan, who, if we mistake not, is the son of ex-Police Commissioner Jourdan, of Brooklyn, is acting as Superintendent of the Fulton-Municipal Gas Company. It will be remembered that Mr. Geo. O. Knapp, formerly in charge of the works mentioned, resigned the position last December to take charge of the Equitable Company's works in Chicago, Ills.

Changing the Buffalo (N. Y.) Method of Street Lamp Assessment.—At a meeting of the Buffalo City Fathers the following resolution, reported by Gen. Graves, was adopted:

"The Common Council shall cause to be raised yearly a sufficient amount of money to defray the expense of lighting and maintaining the lamp district, and keeping the pipes, lamp posts, lamps and other fixtures in repair; one-half of which amount shall be included in the general tax, and paid out of the general fund; the other half shall be apportioned by the Comptroller pro rata per foot front upon the frontage of all the taxable land in the lamp district, as set down in the assessment rolls; and the said lamp tax shall be set down in a separate column of the general tax roll, to be headed 'lamp tax,' and shall be levied upon the lands aforesaid and collected accordingly, omitting from corner lots the tax on side streets to the depth of 100 feet."

A Handsome Structure.—The Chesapeake Gas Company has completed its office and meter building, located on Bayard street, South Baltimore, Md. The structure is 40 by 60 feet, two stories in height, and built of brick, ornately finished in terra cotta trimming. The President's and Supt.'s offices are handsomely finished in oak, and in fact everything about the place has been completed with proper regard to utility, permanence and harmony. The station meters, two in number, calculated to a maximum duty for both of something less than five millions cubic feet per diem, present a massive and handsome appearance. The photometer and laboratory departments are in keeping with the general character of the establishment.

Deacon Oberglock Did not Believe in Gas Meters.—Alas! that we should be called upon to report that another "Deacon" has been found wandering astray from the walks of the righteous; not only so, but this particular shepherd seems to have revelled in iniquity. Flatbush anyway seems to enjoy, at any rate to possess, a wide heterogeneity in the matter of its residential population. On the one hand we see numerous staid and solid descendants of the thrifty Hollanders who discovered the beauties of the location, some two hundred years ago, and on the other we note that Kings county there has placed the institutions in which it cares for its pauper classes. Then, again, a year or two ago the adjacent counties were treated, through the medium of the courts, to a wonderful series of revelations concerning the osculatory practices carried on by members of what afterwards became known as the Flatbush "Kissing Club." However, we do not believe that Deacon Oberglock is to be put down either as a descendant of the Hollanders, an inmate of the county institutions, or as having figured on the membership lists of the "Club." He seems to have followed the peaceful avocation of a country merchant, whose practices in trade compelled the use of a stove, and the employment of a glue pot. Flatbush has a gas company whose affairs are largely intrusted to the charge of Mr. W. A. Armington, and that gentleman is wide-awake, energetic and clever. In common with his uncle, the worthy President of the Brooklyn Gas Light Company, young Mr. Armington is a thorough believer in keeping his unaccounted-for-gas charges down to the lowest possible figure; and latterly he had reason to think that something was wrong with the Flatbush Company's pipes. A hunt after "leaks" was accordingly instituted, and the inspector finally traced an important defect to the vicinity on which fronts the store of Deacon Oberglock. The inspector evidently fails to be a thorough believer in "Deacons," for, despite the Oberglock demurrer, the examiner entered upon the premises of the righteous. The deacon in question never had paid toll to the local gas company—that is, in the past—his meek and lowly habit being amply sated by the glimmer of a candle, or the glare of the kerosene, while his stove gave out the warmth afforded in the combustion of anthracite coal, or an occasional application of coke. The inspector's unerring eye, while calmly surveying the cellar walls of the Oberglock sanctuary, perceived that a false connection had been made to the company's mains, from which a rubber tube led up to the apartment overhead. Following the tube the investigator found that its final destination was in the service to a gas stove in the Deacon's kitchen, as also at the bottom of a glue pot. The inspector reported the "find" to his superior, and Supt. Armington subsequently verified the survey. The Deacon acknowledged his lapse from grace, and immediately offered to settle, whereupon he was presented with a bill amounting to upwards of $300. We presume it will be in order now for the Deacon to make a hegira to "pastures green and fields anew" (possibly he may try to live it down), and if he does betake himself to other quarters it is more than likely that he will prove a most valuable and loud-voiced recruit to the ranks of the "indignant consumer class." We would

respectfully call the attention of "Dr. Robinson, of Columbus," to the possibilities involved in the latter suggestion.

INCREASING THE CAPITAL STOCK.—The Edison Electric Light Company of this city, at a meeting held on March 2, decided to increase its capital stock from 12,942 to 16,000 shares. It is said the increase will be devoted to a purchase of the franchise, sold by the parent company to the Western Electric Light Company, for the States of Illinois, Ohio, and Wisconsin. The Company has been under the impression that it made a mistake in selling the rights mentioned, and will now repurchase them.

SWAPPING GAS STOCK FOR A RACE TRACK.—It is said that the City Council of Atlanta, Ga., has ordered the Finance Committee to sell 600 shares, or so much thereof as may be necessary, of the stock owned by the city in the Atlanta Gas Light Company, in order to raise the sum of $15,000, which is to be expended in the erection of suitable buildings on the grounds of the "Gentlemen's Driving Park Association," to be used for the holding of the yearly fairs given under the auspices of the Piedmont Fair Association. Better have kept the gas stock, gentlemen; for that description of security may always be regarded as a "sure thing."

MAKING IT LARGER.—If capital increase counts as an indicator, the Edison Electric Illuminating Company, of New Bedford, Mass., must be "doing quite well." On the last day of February the managers of the concern increased the capital stock to $100,000, an addition of 100 per cent.

AN Electric Light and Power Company has been incorporated to do business in the village of Greenport, L. I. It is capitalized in $12,000.

CHICAGO'S PUBLIC LIGHTING ORDINANCE.—The Chicago (Ill.) City Council has passed the gas ordinances. The north and south side ordinances give the Companies the right to charge $1 per thousand cubic feet for gas supplied to the public lamps. Burners rated to pass four feet per hour are to be used, and the lighting schedule of last year is to be followed. The west side ordinance provides for the same burners and lighting schedule adopted for the other divisions, but the Companies are to receive $1.50 per thousand for the gas. Last year the west side lamps were maintained in accordance with a moon table. [The west side portion of the ordinance has been reconsidered.]

ONE OF THE POSSIBLE "SNAGS" IN THE JOINT PROPOSITION.—The following from the Providence (R. I.) *Journal*, of Feb. 26, will show how local independent electric light suppliers may interpose an obstacle to the joint supply of gas and electricity by gas companies: "The House Committee on Corporations (Rhode Island Legislature) held a hearing, on the rising of the House yesterday, on the petition of the Providence Gas Company for amendment of charter allowing them to erect an electric light plant, and use the same for lighting and heating purposes, as in the case of the grant to the Pawtucket Gas Light Company last year. The two local electric light companies also presented arguments asking for an extension of their charters which would allow them to make and distribute gas. The Providence Gas Company, through its President, said that the Company intended to take advantage in every improvement of a practical nature in lighting, whether by electricity or any other means not yet developed, and would do so for the benefit of its 2,000 stockholders, among which were represented many trusts and fiduciary interests. The representatives of the local electric companies said they would make no opposition to the Gas Company's request, provided they (the electricians) were allowed to make and distribute gas. The committee held the matter for advisement."

VISALIA (CAL.) TO HAVE LIGHT.—Grants were given last February for the separate operation of gas and electric light companies in the town of Visalia. These conflicting interests have been consolidated in a single corporation, to be known as the Visalia Gas and Electric Light Company. It is proposed to construct the gas plant without delay. Visalia is the capital of Tulare county, Cal., is 62 miles (by rail) southeast of Stockton, and 6 miles east of Goshen Station, on the Southern Pacific Railroad. Population, about 4,000. It is quite eligibly situated.

IT FAILED TO PASS THE LOWER BRANCH.—Senator Spooner's pet project to restrict the price to be charged for gas in the District of Columbia to the net figure of $1 per thousand cubic feet, having passed the Senate, was not acted upon in the House of Representatives. Now that they are trying to charge ex-Speaker Randall with all the misdeeds of the last session of Congress, perhaps the "indignant" Washington consumer had better join in the chorus, "It's all Randall's fault." Mr. Senator Spooner must feel sadly cast down.

TO RECOVER DAMAGES.—On the 22d of January the shot tower of the Gulf Shot and Lead Company, of New Orleans, La., was destroyed by fire. Investigation as to the cause of the disaster proved that the conflagration was caused by imperfect insulation of the electric light wires that entered the building; and after much cogitation the proprietors of the Company, on February 28, entered suit against the Brush Electric Light Company for $17,100 damages, plaintiffs claiming that the negligence of the Brush Company's managers made them responsible for the loss incurred.

TALKING OF A RIVAL GAS COMPANY IN MANCHESTER, N. H.—Our Manchester advices contain the information that a corporation, to be known as the Peoples Gas Light Company, has been organized under the general laws of the State, for the purpose of manufacturing, distributing, and selling carburetted hydrogen gas" in the city of Manchester. The new Company is capitalized in $100,000, and the parties interested, nominally at least, are said to be Messrs. N. W. Ellis, A. Elliot, J. F. Briggs, F. Dowst, and J. B. Varick. The certificate of incorporation was filed on Feb. 28th, and the Manchester City Council, on the following Tuesday, gave the incorporators permission to pipe the streets. Various reasons are assigned for the opposition movement, but we fail to see how any of them can be regarded as valid, for the old Company has performed its duty to the people in every respect. A 20-candle gas is sold there at a net rate of $1.50 per thousand, and the gas plant is ample for any demand likely to be made on its resources. The capital invested is but $100,000; and, take it all-in-all, we imagine that the newcomers will experience much trouble in making any impression on the value of the Gerould stronghold. There is but one way in which to conquer the old Manchester Gas Light Company, and that would be by a fair purchase of a controlling interest in its capital. Still that operation would be an expensive one, for we think the last transaction in its shares was effected at a premium close on to 300 per cent.

NOTICE OF REMOVAL.—Mr. George H. Gregory, the proprietor of the Retort Gas Lamp, is now located at No. 389 Broadway, this city. His former address was No. 337, same thoroughfare.

ANNUAL MEETING, BOSTON (MASS.) GAS LIGHT COMPANY.—At the annual meeting of the Boston Gas Light Company (held March 9) the following Board of Directors was elected: Messrs. Augustus Lowell, Augustus Flagg, Chas. H. Parker, Nath. J. Rust, and Louis Curtis. Mr. Augustus Lowell was chosen President; Mr. W. W. Greenough, Treasurer; and C. C. Smith, Clerk.

DEATH OF MR. JAS. H. WALKER, SR.—We regret to announce the decease of Mr. Jas. H. Walker, Sr., whose demise occurred, at Tonawanda, N. Y., on the 1st inst. Deceased was well known to the fraternity. He was at one time in the service of the Milwaukee (Wis.) Gas Light Company; later on he had charge of the Citizens works at Rochester, N. Y.; and at the time of his death was Supt. of the Tonawanda Company's plant. Deceased was in his 59th year.

A Substitute for Coal.

The London *Journal* explains that an invention of considerable interest to all consumers of coal has been brought out by Mr. Sahlstrom, of the Normal Company, Aberdeen, and is at present in operation at the Company's works. After a long series of experiments the inventor has succeeded in producing a fuel which gives most satisfactory results. It is described as having for its basis pitch oil, in combination with superheated steam decomposed by an agent, the nature of which he does not at present wish to divulge. The invention, which has been in practical use in the Company's works for some time past, is stated to effect a saving of nearly 30 per cent. in the cost of fuel. It is considered possible that even better results may be attained with a specially constructed boiler. The one at present in use was built for a coal fire, but has been adapted by Mr. Sahlstrom to receive the oil fuel. The arrangements for feeding the fire are exceedingly simple and convenient. On a shelf raised about 4 feet above the level of the floor stands a small tank, having a graded attachment to show the quantity of oil drawn from it within a given time. From this tank (which is replenished when necessary from a larger one) a pipe leads downwards to the furnace, and is joined there by another pipe, which conveys the decomposed steam to its union with the oil at the jet, both being fed automatically. The volume of fuel supplied is governed by means of a small tap fixed near the furnace, and easily controlled by the attendant. The rapidity of the combustion is so great that a heat of upwards of 3,000° is attained. Mr. Sahlstrom claims three special advantages for his process. First, its cheapness; secondly, that it is absolutely smokeless; and thirdly, that the combustion is complete—every portion of the heat contained in the fuel being utilized. In addition to these, it has a manifest superiority over coal in the matter of cleanliness, and in the number of attendants required—one man being sufficient to look after as many oil fires as would necessitate the employment of three or four where coal is used. Mr. Sahlstrom is confident that the introduction of his process into foundries would be attended with the greatest success, as the intense concentration of the heat would permit the use of smaller melting ovens. In the furnace now in use wrought iron can be melted in 15 minutes.

The Market for Gas Securities.

Absolute stagnation characterizes the situation in the local gas share market. During the fortnight a slight "boom" was developed in Consolidated, during which period the highest price touched was 86; but subsequently the specialty sagged off. Appearances indicate that Consolidated is decidedly a purchase at the present time. Equitable is at 125 or thereabouts, and is strongly held. Brooklyn transactions are smaller than ever, in fact sellers and buyers are waiting upon the Legislature. It is curious to note how well disposed the present Legislature seems to be towards gas proprietors. Perhaps they sorrow over the way in which they settled the New York case. The Chicago deal seems to be disposed of, with the possible exception of "adjusting" gas rates. It is a trifle amusing to note the assertions in some of the Chicago despatches eastward, which claim that Mr. Watkins disposed of his holdings so precipitately as to lose nearly $500,000. Perhaps he did; but somehow or another the impression prevails that if anybody got over 170 for his stock Mr. Watkins was that fortunate individual. At the sale of the Atlanta (Ga.) gas stock held by the city, par and over was realized. The shares were bought by those who knew their value.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

March 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	84	—
Central	440,000	50	30	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	126	128
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	102	103
" Bonds	1,500,000	1000	101	—
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	50	—
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	104	—
Citizens	1,200,000	20	—	68
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	135	—
" Bonds	300,000		—	106
Peoples	1,000,000	10	54	56
" Bonds	290,000	—	100	—
" "	250,000	—	100	—
Metropolitan	1,000,000	100	78	80
Nassau	1,000,000	25	102	104
" Ctfs	700,000	1000	100	—
Williamsburgh	1,000,000	50	125	—
" Bonds	1,000,000	—	107	—
Out of Town Gas Companies.				
Boston (Mass.) Gas Co.	2,500,000	500	870	875
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	140	145
" " Bonds	45,000	—	—	—
Chicago Gas Co., Ills.	5,000,0000	25	142	145
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		29	31
Cincinnati G. & C. Co.	6,000,000	100	184	185
Consolidated, Balt.	6,000,000	100	58½	—
" Bonds	3,600,000		107	107½
Chesapeake, Balt.	1,500,000	100	79	80
"	1,000,000		100	102
Consumers Toronto	1.000,000	50	194½	196½
Central, S. F., Cal.			82½	84
Capital, Sacramento, Cal.			55	58
Hartford, Conn	750,000	25	140	142
Jersey City	750,000	20	155	—
Laclede, St. Louis, Mo.	1,600,000	100	110	112
Louisville, Ky.	2,570,000	50	130	132
Little Falls, N. Y.	50,000	100	95	100
" Bonds	25,000	—	100	103
Montreal, Canada	2,000,000	100	209	215
New Haven, Conn		25	190	195
Oakland, Cal.			35	36
Peoples, Jersey City		—	25	30
" " Bonds			—	—
Paterson, N. J.		25	90	—
Rochester, N. Y.		50	75	80
St. Louis, Missouri	600,000	50	—	475
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	60¼	60½
Memphis (Tenn.) Gas	750,000	100	80	82
" Bonds	240,000	100	103	—
Washington, D. C.	2,000,000	20	190	—
Wilmington, Del.		50	205	215
Havana (Cuba) Gas Co.	3,000,000	100	18	20
" Bonds	550,000		102	—

ENGAGEMENT DESIRED

As Superintendent of Coal or Water Gas Works.

Has had years of experience in manufacture or distribution of gas and construction of works. Satisfactory references furnished. Address "E.," care this Journtal.

WANTED,

By a practical man of many years' experience,

A Position as Superintendent of a Small Gas Works in a Growing Town,

where experience will be of value. Salary not so much an object. Best of references Address
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ALBO-CARBON FIXTURES FOR SALE.

Three 12-Burner, Two 8-Burner, and Fourteen 6-Burner Clusters.

All in good order, having been used but six months. Will be sold cheap. For particulars communicate with
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By a practical gasfitter and competent bookkeeper, who has had entire management of coal and water gas plants. Satisfactory references furnished. Address
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Superintendent's Position Desired

By a practical man of twenty-five years' experience in the manufacture and distribution of coal and water gas. Satisfactory references given. Address
646-tf "ENGINEER," care this Office.

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By a practical manager of coal and oil gas works, of 22 years graduation in all the departments—viz., distribution, manufacture, and secretary's duties. Also has a partial knowledge of electric lighting. Satisfactory references given. Address
665-tf R. HORTON, care this Office.

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Two Sinuous Friction Condensers

Each 1 ft. 3 in. wide by 11 ft. 3 in. long, and 18 ft high, of sufficient capacity for 225,000 cu. ft. per day. Apply to
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FOR SALE,

Ten No. 2 Siemens Regenerative Gas Lamps,

With Factory Fixtures and Reflectors complete and in order. Only used three or four months. Will be sold cheap.
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Steel Boilers set with Jarvis Pat. Boiler Setting,

To burn **COKE SCREENINGS** for Fuel.

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Belting direct to Dynamos, without using Shafting.

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Ferric Oxide for Gas Purification.

Ferric Oxide, as ground, screened, and prepared by me for purifying purposes, has now been in use for several years by many of the gas works throughout the country, including Detroit, Chicago, Milwaukee, East Saginaw, Burlington (Iowa), Ann Arbor, etc. It has proved, as I believe, the **Most Effective and Economical Agent** now in use. I am prepared to furnish the Oxide by the 100 lbs. or in car load lots, and will be pleased to give price f.o.b. cars at Ann Arbor or at place of destination. Address

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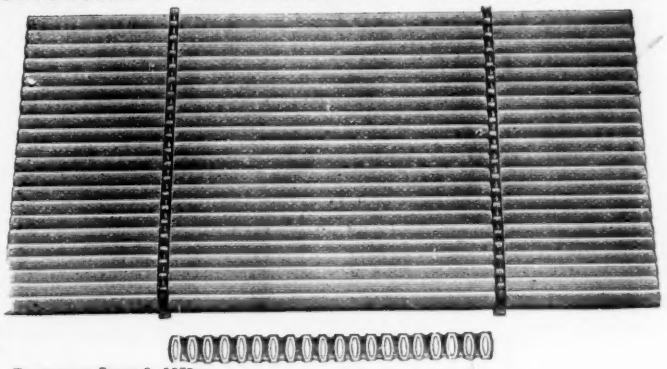

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The Perfection of Gas Lighting.

Producing the Highest Illumination yet obtained from Gas, and

EFFECTING A SAVING IN ITS CONSUMPTION.

It has been most effective in

Replacing Electricity,

AFFORDING A

SOFT WHITE LIGHT

of **EXTREME BRILLIANCY & POWER.**

It has been most successful in

Supplanting Kerosene,

Giving Increased Light, Less Heat, and Perfect Safety

WITHOUT ADDITIONAL COST.

NOTICE.—Suits are pending in the United States Circuit Courts in Illinois and Pennsylvania against various parties for infringement of our Letters Patent No. 247,925, dated October 4, 1881, and No. 333,862, dated Jauary 5, 1886. The first of these suits has come up for hearing, and an injunction has been granted therein. The second of said suits has not yet been reached for hearing. All persons are cautioned against manufacturing, selling, or using any apparatus or material which infringes our Patents. We intend to prosecute all parties infringing patents owned by us.

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Sole Manufacturers for the United States.

DURING THE PAST YEAR, THE

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Have Erected Twelve Sets of Water Gas Generating Apparatus under the *Springer Cupola* System. They are as follows:

1886

Newton Illuminating Company, Newton, Kansas.— Daily capacity, 120,000 cu. ft.
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Chippewa Falls, Gas Light Co., Chippewa Falls, Wis.— Daily capacity, 120,000 cu. ft.
Elkhart Gas Light & Coke Co., Elkhart, Indiana.— Daily capacity, 120,000 cu. ft.
Madison City Gas Light Company, Madison, Wis.— Daily capacity, 120,000 cu. ft.
South Bend Gas Light Co., South Bend, Indiana.— Daily capacity, 250,000 cu. ft.
Sheboygan National Gas Comp'y, Sheboygan, Wis.— Daily capacity, 120,000 cu. ft.
Salina Gas Light Company, Salina, Kansas.— Daily capacity, 120,000 cu. ft.
Rathbun Company, Deseronto, Province Ontario.— Daily capacity, 80,000 cu. ft.
Jefferson City Gas Light Co., Jefferson City, Mo.— Daily capacity, 120,000 cu. ft.
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1886

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REGENERATIVE FURNACES
Self-Sealing Mouthpieces and Bridge Pipes,
RETORT HOUSES, WASHER-SCRUBBERS
GASHOLDERS, AND GAS WORKS COMPLETE.

Our system of heating retorts by regenerative furnaces is the simplest, most economical, most durable, and cheapest of any in use. It is the only regenerative furnace used to any extent in Great Britain, where several thousand retorts are working at the present time. In Birmingham alone 952 retorts were erected, and they are giving the best satisfaction ever obtained from any regenerative furnaces. The great advantages our benches have over all others are the following:

The generator and regenerator are independent of each other, so that any contraction or expansion of one will not interfere with the other.

The superheating surface is greater than in any other furnace yet constructed. The regenerator is absolutely self-tightening, and cannot get out of order.

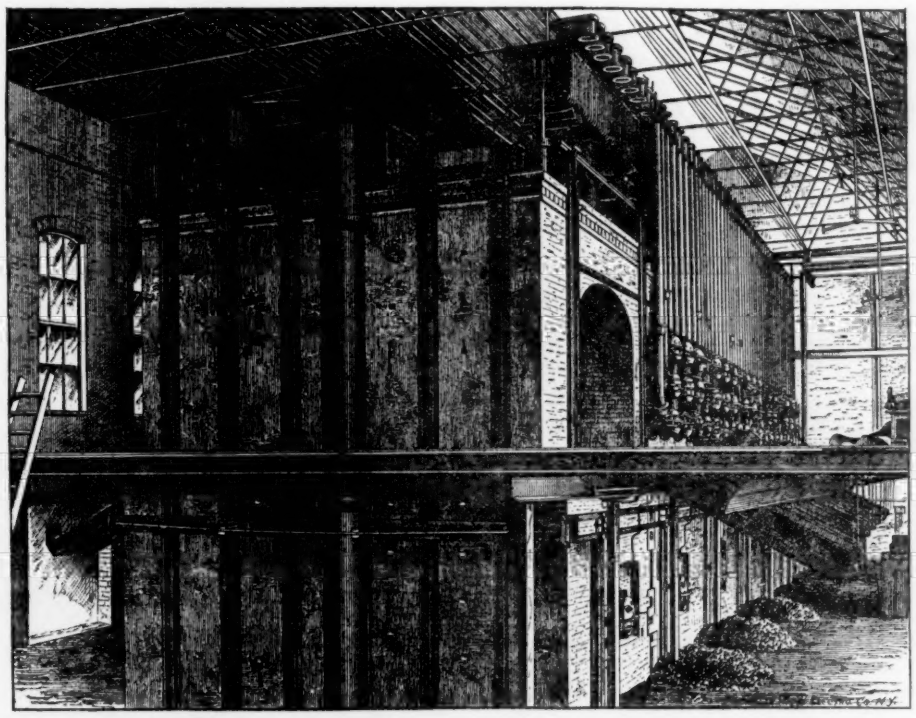
The thickness of material between the waste gases, secondary and primary air is only 1¼ inches, which increases the regenerative power from 100 to 500 per cent.

The generator is working absolutely cold, and therefore is not liable to any perceptible wear and tear.

The grate, having an enormous surface, allows the use of an inferior fuel, such as breeze, fine coke, or slack coal.

Clinkers are never formed. By an ingenious arrangement of mixing air and the steam produced by the cooling water all incombustible materials in the fuel are formed into soft ashes.

The waste gases go up through flues at 400° to 500° F. No large chimneys are required.



No cold air can enter; consequently no cracking of retorts.

The generator is inside of bench, thereby preventing any loss of heat; and stokers do not have to stand on a hot floor, as is the case where the generator projects outside of the bench.

In the past two years more than 500 retorts, with a capacity of five million cubic feet of gas per diem, have been erected in this country, and these are giving the best satisfaction, as the following testimonials will show.

We also construct half-regenerative benches, which will give the best results, and can be built in existing skeleton arches.

OFFICE OF THE NEWARK GAS LIGHT COMPANY, NEWARK, N. J., January 28, 1887.

MR. FREDERICK BREDEL, General Agent Kloenne Regenerative Furnace:

Dear Sir—The Kloenne Furnaces erected by you have been in continuous use for more than a year, and continue to give us satisfactory results. We are carbonizing 1,800 pounds coal per retort in 24 hours, and the average fuel consumption for this much has been 16.8 pounds by volume of the coke produced, or 100 pounds coal have been carbonized by 11.25 pounds hot coke. We have not lost a retort yet, and I think that those in use will give us six months' more service.

Very truly, [Signed] EUGENE VANDERPOOL.

ENGINEER'S OFFICE, MILWAUKEE GAS LIGHT COMPANY, MILWAUKEE, WIS., January 26, 1887.

FRED. BREDEL, C.E.: Dear Sir—Upon your request for a testimonial for publication, I am pleased to send you the following, as I consider it deserved for the way in which your contract was carried out with us. I would say to any in the profession that among all the plans of benches presented to me from which to select I chose the "Kloenne" for several reasons. I considered it perfect in principle, that at all times it would be under absolute control, and also that each block in the regeneration could be easily seen and repaired if necessary. Your work upon our benches was done as good as it possibly could have been by anyone, and such has been the opinion of the several visitors during the progress of the work and since its completion, without exception. We have been running the furnaces since Oct. 6, and as yet have observed no cracked or sagged retorts. Every part of the work appears as perfect as when set. Although the first month was used up in experimenting and learning how to run the furnaces, and since that time we have experienced very cold weather, yet we are *selling* 26 bushels of coke (40 lbs. per bushel) per net ton of coal used. The consumption of coke in the furnaces does not exceed 20 per cent. at the present season, and for the year I am sure will be materially less.

Yours truly, [Signed] E. G. COWDERY.

OFFICE OF THE CHICAGO GAS LIGHT AND COKE COMPANY, CHICAGO, ILL., January 27, 1887.

FRED. BREDEL, Esq.: Dear Sir—We have had eight benches of nines with the Kloenne furnaces running continuously for 13 months. The results have averaged 9,000 cubic feet per mouthpiece in 24 hours, with a fuel consumption of 13 pounds coke per 100 pounds coal carbonized.

Yours truly, [Signed] THEOB'D FORSTALL, *V.-P.*

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Made in Sizes of 5, 10, 15, 20, and 25 Horse Power. All Engines Guaranteed for One Year.

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The Latest and Most Improved Gas Light!

ADAPTED FOR PRIVATE RESIDENCES, CHURCHES, THEATERS, STORES, ETC.

These Burners are manufactured on the principle of enriching gas by means of Naphthaline (so-called Crystal Carbon or Albo-Carbon), the invention of the Rev. W. R. Bowditch, F.R.S., of Wakefield, England, who was the original inventor and patentee of this system of gas lighting.

SPECIAL NOTICE.

Many Gas Companies find the Crystal Carbon Light a valuable competitor against the Electric Light. It is ornamental, free from the defects common to all other enriching gas burners, and is as cheap as ordinary gas chandeliers. We sell direct to gas companies, giving them the benefit of agents' discounts.

CARBONCRYSTAL.

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A new and superior preparation for enriching gas used in conjunction with Crystal Carbon or Albo-Carbon gas lights. The preparation is cleaner and better adapted for filling burner vessels than any hitherto produced. Guaranteed to be chemically pure. Supplied in cans from 10 pounds up.

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GAS vs. ELECTRIC LIGHT.

We would invite attention to the able and exhaustive argument of General A. Hickenlooper, President of the Cincinnati Gas Light and Coke Company, contained in a handsome pamphlet of 96 pages, entitled

"EDISON'S INCANDESCENT ELECTRIC LIGHTS FOR STREET ILLUMINATION. REPORT OF AN ARGUMENT DELIVERED BY A. HICKENLOOPER BEFORE THE COMMITTEE ON LIGHT, MUNICIPAL COUNCIL, CITY OF CINCINNATI, JULY 22, 1886."

This is a subject of special interest to all Gas Light Companies.

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Our Patent System of Instantaneously Lighting Gas (without electricity) for R. R. Depots is unequaled. Our High Candle Power Burner is superior to the Electric Light or any other High Candle Burner. We manufacture every description of Ornamental Lamps.

WONDERFUL GAS LIGHT!

Great improvements! New inventions! Brilliant success! Brilliant light! Over 500,000 of the Gas Lamps and Burners designed by GEO. H. GREGORY now in practical use. Send for Catalogue. Prices reduced on all goods in order that Gas Companies will introduce the goods to the consumer at a reasonable price. Over one hundred Gas Companies are selling the new lamps and burners. The only way to prevent the adoption of incandescent electric light is to put on the wonderful gas lamps and burners. Address

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GAS EXHAUSTERS

Have long been regarded as "luxuries" not to be thought of by small companies; but

CONNELLY'S JET EXHAUSTER IS WITHIN THE REACH OF ALL!

Will Pay for Itself in Six Months! Saves Labor! Lengthens the Lives of Retorts! Prevents the Formation of Carbon! Increases the Yield from Twelve to Fifteen Per Cent.!

We find, after careful inquiry and investigation, that the majority of the Gas Works in the United States and Canada are running *without Exhausters*, which, in our opinion is due to two causes. *First.* The prices heretofore asked for Exhausters have been so high as to counteract, to a great extent, the advantages to be obtained from their use, and caused most managers to postpone their adoption indefinitely, or until their consumption had largely increased. *Second.* Many superintendents have a false impression that it will not pay to run an Exhauster in works producing less than 20,000 feet per day.

The first difficulty we overcome by selling our Exhausters at *extremely low prices*, as will readily be admitted after comparing our list with those of other manufacturers; and as to the second, we can say we have most convincing evidence from many companies operating our Exhausters that they can be used to advantage in works producing *as low as* 6,000 *cubic feet per day.*

In our improved Exhauster we combine the "Exhaust Tube" Gas and Steam Governors, Gas Compensator, and Bye-Pass Valves in the most compact form possible, which is a very great advantage to the machine, besides enabling us to manufacture and sell at the low prices given.

This is the only Exhauster in the market having a "compensator" in addition to the "gas governor"—a most important improvement, as it does away with all possible danger of their ever drawing air, and thus reducing the illuminating power of the gas.

FOR OIL GAS WORKS.

Our Exhausters are especially adapted for the use of Oil Gas Works; and where oil is required to dilute the gas a valve can be adjusted *to take the exact amount of air required*, thus dispensing with air pumps and their attendant labor and annoyance.

POINTS OF SUPERIORITY.

Requires *one-half the floor space* and *one-third less steam* than any other Exhauster in the market of same capacity. *More cheaply and easily connected*, as outside "Bye-Pass Valves" are dispensed with. It is the only Exhauster manufactured having "Compensator" and "Governor" *combined*, the "Compensator" with all other Exhausters being a separate and distinct machine. It is simple in construction, easily adjusted, not liable to get out of order, and *can be operated by ordinary workmen.*

NAPHTHALINE AND STEAM JET EXHAUSTERS.

As many superintendents of Gas Works believe the use of a Steam Jet Exhauster will inevitably cause trouble from *naphthaline* deposits, we recently sent out letters of inquiry to superintendents using our Steam Jet, asking for their experience, and the following replies speak for themselves. That naphthaline deposits are often unjustly attributed to Jet Exhausters is well known by many superintendents. When the cause cannot be determined it seems to be the rule to place the responsibility on the Jet Exhauster, *if they have one;* but if no Exhauster is used *the cause remains a mystery.*

OFFICE LISTOWEL GAS LT. CO., LISTOWEL, CAN., May 29, 1885.
Messrs. Connelly & Co., Ltd.: Gentlemen—The Exhauster purchased from you over three years ago, and now in use, has proven in every way all you claim for it, and has given us great satisfaction. No trouble has arisen from naphthaline.
Yours respectfully, F. W. HAY, Sec.

RICHMOND GAS CO., RICHMOND, KY, June 1, 1885.
Messrs. Connelly & Co., Ltd., 407 Broadway, N. Y: Gentlemen—I put in your Steam Jet Exhauster last November. I think it a perfect machine, as it requires no attention whatever. Have not had any naphthaline to contend with; it would be very easy to get rid of that substance if I had it. Yours very truly, J. B. GORDON, Supt.

HAMPTON, VA., June 3, 1885.
Messrs. Connelly & Co., Ltd.: Gents—We have been using your Steam Jet Exhauster for the past 3 years, and have never had any trouble with it whatever, either from naphthaline or any other source. Yours truly, J. B. H. GOFF.

BRUNSWICK, ME., May 27, 1885.
Messrs. Connelly & Co., Ltd.: Dear Sirs—Your favor of 23d inst. at hand. In answer would say your Exhauster works well with us. We make an oil gas; are not troubled with naphthaline. Very truly yours, B. G. DENNISON, Prest. Brunswick Gas Lt. Co.

WILMINGTON, O., June 15, 1885.
Messrs. Connelly & Co., Ltd.: Dear Sirs—We started your make of six-inch Steam Jet Exhauster March 30, and I am pleased to state, from the time the steam was turned on, it has performed its work to our entire satisfaction. We have never had any other but a Steam Jet Exhauster, and have never been troubled with naphthaline. For many reasons I prefer it to the "rotary," and have no hesitancy in recommending it.
Yours truly, E. W. HAMLIN, Sec. Gas Co.

OFFICE LOGAN GAS LT. & COKE CO., LAGAN, HOCKING CO., O., May 29, 1885.
Connelly & Co., Ltd.: Gentlemen—In answer to yours of 27th we have to say that the Steam Jet Exhauster put in for us by you last fall has been used constantly since, and, up to this time, we have had no trouble with naphthaline. We have heard many gas men say that a Steam Set Exhauster is liable to bring on trouble with naphthaline, and we have had that fear before us; but so far we have escaped, and we trust we may not have any experience with that gas manager's bugbear.
Yours truly,
LOGAN GAS LT. & COKE CO.

OFFICE ATHENS GAS LT. CO., ATHENS, O., May 30, 1885.
Messrs. Connelly & Co., Ltd.: Dear Sirs—We take pleasure in giving you an unqualified endorsement of your Steam Jet Exhauster. It has been in place almost a year; been tested in all seasons and under all conditions; it has always proved true to the work assigned it. We have had no naphthaline deposit, nor any trouble chargeable to the Exhauster. Nothing but good has come from it, and *great* good at that. We can't do without it. Very truly yours, C. H. WELCH, Supt.

OFFICE MEADVILLE GAS WORKS, MEADVILLE, PA., May 29, 1885.
Connelly & Co., Ltd.: Gents—Yours of the 27th received and contents noted. Would say that after using your Steam Jet Exhauster for the past 18 months, find it perfectly satisfactory in every way. So far as naphthaline is concerned, we have had no trouble whatever as yet. Yours, GEO. S. CULLUM, Supt.

NYACK AND WARREN GAS LT. CO., NYACK, N. Y., May 25, 1885.
Connelly & Co., Ltd.: Gentlemen—Since your Jet Exhauster has been here there has been no trouble, and certainly *no naphthaline.* The only trouble I have experienced was the Jet becoming clogged with tar last week, and I cleaned it in a few minutes. It has run over three years without any trouble or cost for repairs. Yours truly,
A. MURRAY, Lessee and Manager.

OFFICE CADIZ GAS LT. CO., CADIZ, O., May 29, 1885.
Messrs. Connelly & Co., Ltd.: Gentlemen—Yours of 22d, inquiring how our Steam Jet Exhauster is doing, has been received. We have been using one of your Exhausters about four years, and with the best of satisfaction. We have less trouble with carbon in retorts, make more gas from same amount of coal than before, and have no trouble with stoppage in pipes or trouble from tar; and as regards naphthaline, we are not troubled with it, and do not know what it is to have any stoppage in pipes from naphthaline.
Very truly yours, A. N. HAMMOND, Sec.

SIDNEY (OHIO) GAS WORKS, June 1, 1885.
Connelly & Co., Ltd.: Gentlemen—We have now been using one of your Steam Jet Exhausters about five months, and thus far it has given us perfect satisfaction. We get a better yield and a more brilliant quality of gas from the coal. We have seen in papers and heard from different individuals that Steam Jet Exhausters were productive of naphthaline. "*We can't see it,*" as we have found no trace of it in the works, mains, services, or meters. Respectfully yours, W. W. GRAHAM, Supt.

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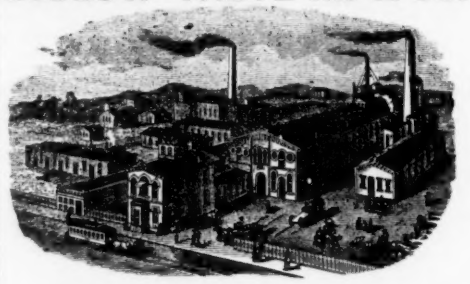

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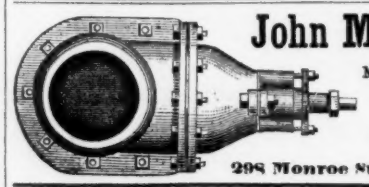

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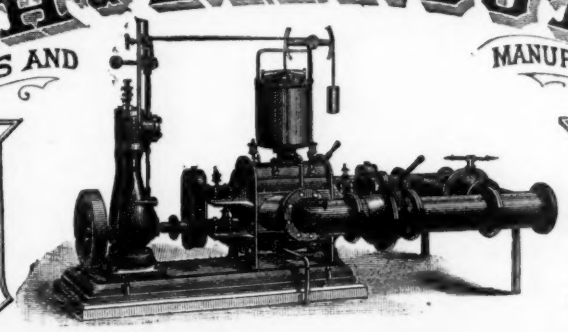

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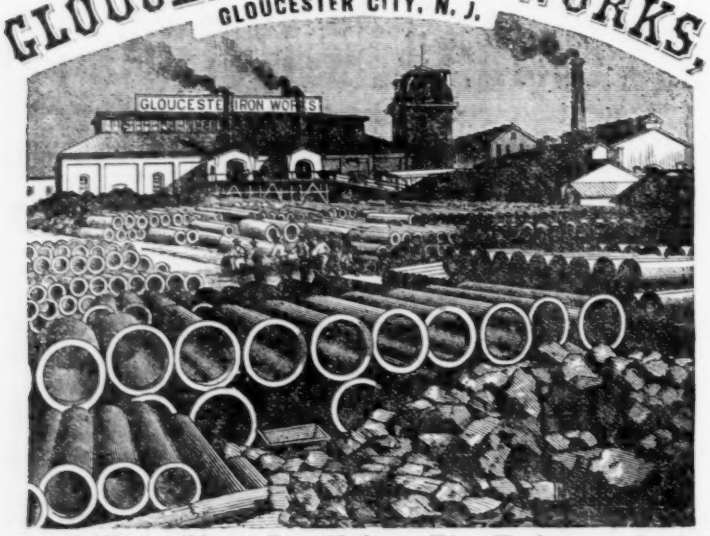

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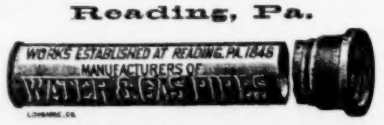

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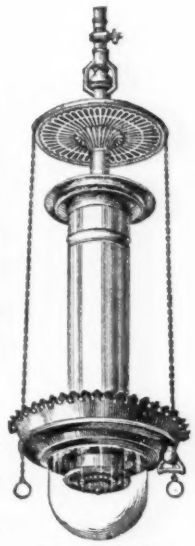

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FURTH, GERMANY	400,000 "	BRUNSWICK, GERMANY	300,000 "
FREIBURG, GERMANY	200,000 "	LILLE, FRANCE	750,000 "
NINE ELMS, LONDON	3,000,000 "	CADIZ, SPAIN	300,000 "
MELBOURNE, AUSTRALIA (2)	3,000,000 "	READING, ENGLAND	2,000,000 "
GLUCKAUF COKE WORKS, GERMANY.	200,000 "	LINCOLN, U. S	250,000 "
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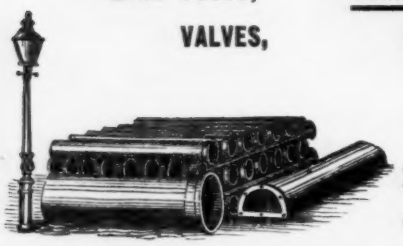

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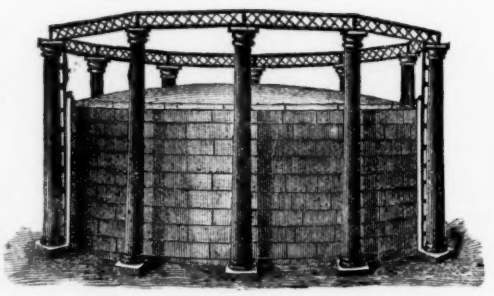

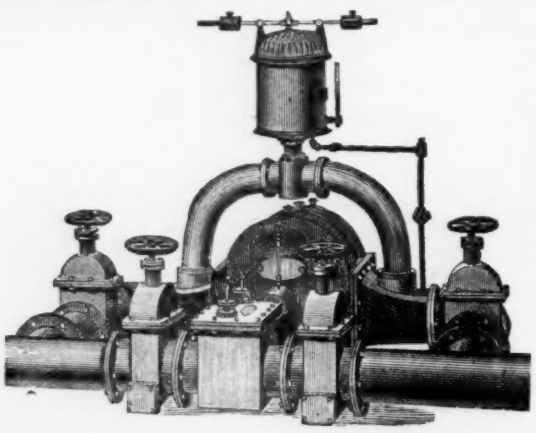

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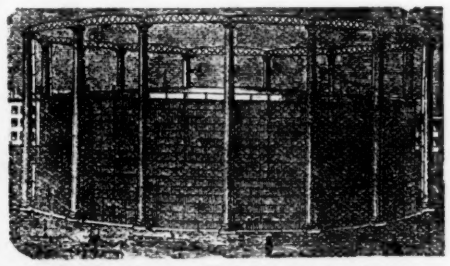

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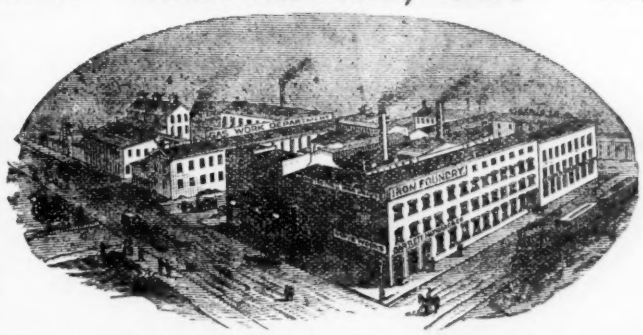

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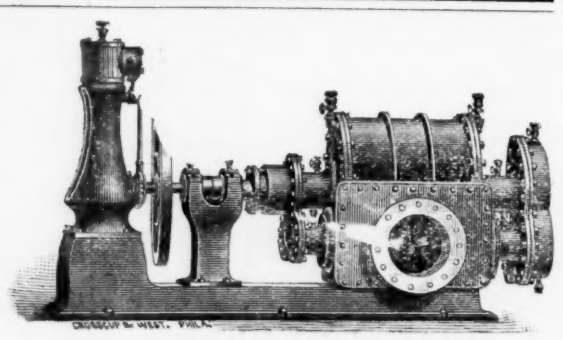

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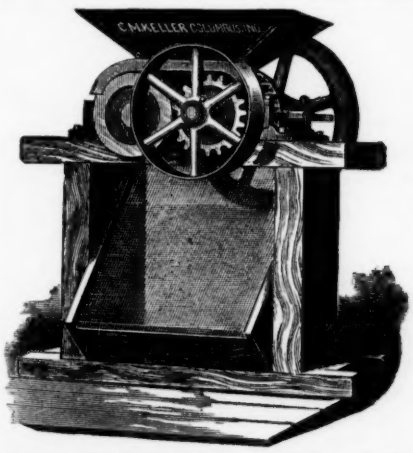

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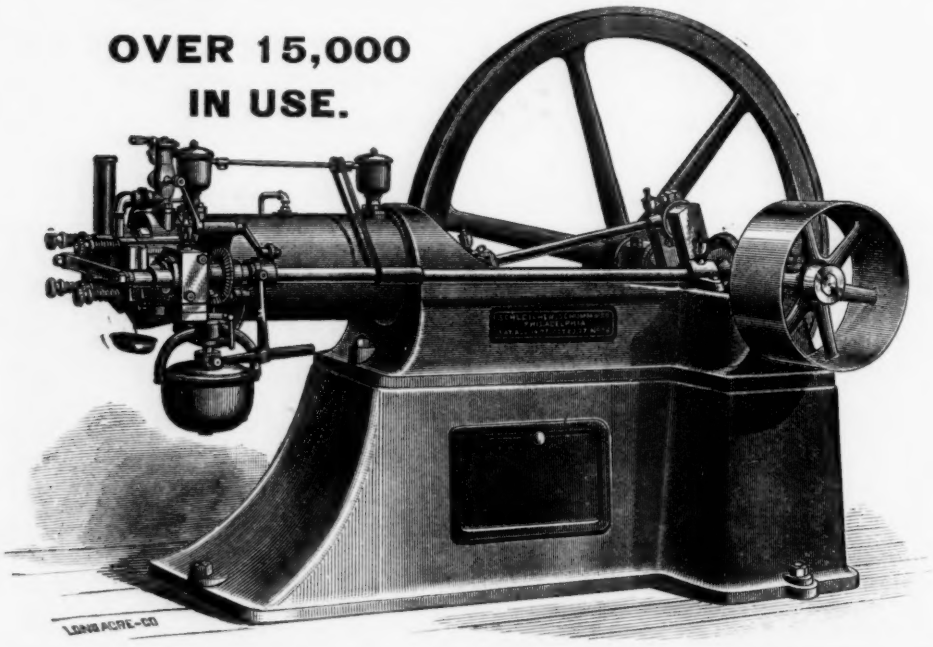

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